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ONTARIO WATER RESOURCES COMMISSION

THE ONTARIO WATER RESOURCES COMMISSION

REPORT ON

LAKEHEAD

INDUSTRIAL WASTES INSPECTIONS

APRIL 13 - 17, 1959

By: R. H. Millest and W. S. MacDonnell

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PARLIAMENT BUILDINGS - TORONTO

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Port Arthur Waterfront Industries

ELEVATORS

Alberta Pool Elevators Ltd.	Winnipeg, Manitoba.	
Canadian Consolidated Grain Co.	506 Grain Exchange Bldg., Fort William, Ontario.	Carl W. Fleming Terminal Manager.
Canada Malting Co. Ltd.	P. O. Box 179, Port Arthur, Ontario.	Bruce M. Cohoe, Manager.
Federal Grain Ltd.	407 Grain Exchange Bldg., Fort William, Ontario.	H. J. Willett, General Manager.
Manitoba Pool Elevators	30 St. Paul Street, Port Arthur, Ontario.	Roy Grant, General Superintendent
McCabe Bros.	P. O. Box 65, Fort William, Ontario.	A. J. J. Meyer, Superintendent.
Parrish & Heimbecker Ltd.	Winnipeg, Manitoba.	
Richardson & Sons Ltd. (Eastern Terminal Elevator)	Winnipeg, Manitoba. P. O. Box 897, Port Arthur, Ontario.	A. L. Grant, Manager.
Saskatchewan Pool Terminals Ltd. " " " "	Regina, Saskatchewan. 34 N. Cumberland Street, Port Arthur, Ontario.	Clifford R. Linderman, General Superintendent.
United Grain Growers Ltd. " " " "	Grain Exchange, Winnipeg. cor. Park Rd. & E/S Cumberland N. Port Arthur, Ontario.	Donald Smith, Superintendent.

INDUSTRIES

Abitibi Power & Paper Co. Ltd.	P. O. Box 390, Port Arthur	Gordon A. Sutton, Manager, Thunder Bay Div.
Provincial Paper Ltd.	P. O. Box 450, Port Arthur	E. G. Pallister, Manager.
The Nichols Chemical Co. Ltd.	c/o J.L. Sture, Legal Dept. Allied Chemical & Dye Corpn. 40 Rector Street, New York 6, N. Y.	
The Nichols Chemical Co. Ltd.	McDougall at Waterfront, Port Arthur, Ontario.	E. H. Burk, Superintendent.
Canadian Liquid Air Co. Ltd.	Bare Point, Port Arthur, Ontario.	Gus Buckle, Manager.
" " " " "	1111 Beaver Hall Hill, Montreal 1, P. Q.	

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INDUSTRIES (cont'd)

Port Arthur Shipbuilding Co. Ltd.	P. O. Box 690, Port Arthur, Ontario.	G. F. McDougall, General Manager.
Great West Planing Mills Ltd.	Bank of Montreal Chambers, Port Arthur, Ontario.	Andrew Johns, General Manager.
A. E. Jacobson Timber Co.	P. O. Box 234, Port Arthur, Ontario.	Albert E. Jacobson, President & Gen. Manager.
Port Arthur Lumber & Planing Mill	P. O. Box 745, Port Arthur, Ontario.	William Shewchuk, Manager.
Northern Wood Preservers Ltd.	P. O. Box 990, Port Arthur, Ontario.	R. J. Prettie, President & Gen. Manager.
Koppers Products Ltd.	1550 Koppers Bldg., Pittsburg 19, Pennsylvania.	
" " "	Maureen Street, Port Arthur, Ontario.	R. A. Munson, Superintendent

City Engineer's Office,
Port Arthur, Ontario.
April 28, 1959.

TIMES OF ARRIVAL AND DEPARTURE

DEPART Malton via T.C.A Sunday April 12, 5.55 p.m

ARRIVE Port Arthur - 9.10 p.m April 12th

DEPART Port Arthur Wednesday April 15th, 12.40 p.m via "Canadian"

ARRIVE Dryden 6.20 p.m

DEPART Dryden, Thursday April 16th 1.30 p.m via Lands & Forests"
possible to arrange a mtg with Council head 1 pm.

ARRIVE Kenora 5.00 p.m

DEPART Kenora, Friday April 17th, 10.35 p.m via "Dominion"

ARRIVE Port Arthur 6.15 a.m

DEPART Port Arthur, Saturday April 18th 8.40 a.m via T.C.A.

ARRIVE Toronto 11.35 a.m

HOTEL RESERVATIONS

Prince Arthur Hotel	-	Sunday night April 12th Monday April 13th Tuesday April 14th Vacating Wednesday " 15th noon
Dryden Hotel	-	Wednesday Evening April 15th Vacating Thursday April 16th noon
Kenora Hotel	-	Thursday April 16th Friday April 17th

SCHEDULE OF MEETINGS

Monday April 13th

9. 00 a.m	Mr. E. G. Pallister, Mill Manager, Provincial Paper Co. Ltd., Port Arthur, Ontario
11. 00 a.m	Mr. L. A. Hurrel, Superintendent, Grain Elevator, 328 River Street, Port Arthur, Ontario
2. 00 p.m	Mill Manager, Port Arthur Division, Abitibi Power & Paper Co. Ltd., Port Arthur, Ontario
4. 00 p.m	Mr. R. S. Prettie, President, Northern Wood Preservers Ltd., Port Arthur, Ontario

Tuesday April 14th

9. 00 a.m	Mr. D. Stevens, Superintendent Husky Oil & Refining Co., Fort William, Ontario
10. 30 a.m	Mr. C. T. Anderson, Mill Manager, Fort William District, Abitibi Power & Paper Co. Ltd., Fort William, Ontario
2. 00 p.m	Mr. C.J. Jeffery, Mill Manager, Great Lakes Paper Co. Ltd., Fort William Ontario
4. 30 p.m	Mr. G.L. McArthur, District Manager, Olgivie Flour Mills Ltd., Fort William, Ontario

Wednesday April 15th

9. 00 a.m	Mr. J. Marshall, City Engineer, City Hall, Fort William
10. 30 a.m	Mr. T. Fell, City Engineer, Port Arthur, Public Utilities Building.
12. 40 p.m	Depart via "Canadian" to Dryden

Others to contact: Russell Hallenquist, Secretary Manager,
North Western Ontario Timber Operators Assoc.,

INFORMATION SERVICE

ONTARIO WATER RESOURCES COMMISSION

A. M. SNIDER, CHAIRMAN
A. E. BERRY, GENERAL MANAGER
B. LARMOUR, SECRETARY
W. S. MacDONNELL, EXECUTIVE OFFICER

JOHN C. SCOTT, INFORMATION OFFICER, EAST BLOCK, PARLIAMENT BUILDINGS, TORONTO 2

For release at 12 noon, E.S.T. (1 p.m. E.D.T.), Friday, May 1, 1959,
--PLEASE GUARD AGAINST PREMATURE PUBLICATION--

OWRC RELEASES LAKEHEAD WATER SURVEY REPORT

TORONTO, May 1--Consideration should be given to the integration of water and sewer systems in Port Arthur, Fort William and the townships of Neebing and McIntyre, it is suggested in the Ontario Water Resources Commission's report or a water resources and stream pollution survey of the Lakehead area.

Released today, the report states that implementation of the integration plan might be considered in stages. The initial stage would be the integration of these systems for Port Arthur and McIntyre on one hand, and Fort William, Neebing and McIntyre on the other hand.

For purposes of the report, the Lakehead area is defined as including the cities of Port Arthur and Fort William, and the townships of Shuniah, Neebing, Oliver and Paipoonge.

The report further states that where feasible consideration should be given to joint sewage treatment facilities for these municipalities. Industries which are large water consumers should to advantage continue to be located near the waterfront.

It is stated that the survey indicates the need for additional work in the area which will involve an over-all pollution survey of the watercourses and Thunder Bay, including more detailed studies of the best supplementary source of water supply for Fort William. It points to the need for a concentrated co-operative effort between the pulp and paper industry and the Ontario Water Resources Commission toward development of an economical and satisfactory method of treating wastes from the industry's plants. It is noted that the waste from the four pulp and paper mills in the area has an oxygen demand equivalent to the sewage from a population of 1,236,000.

For Fort William, the report states, a supplementary source of water supply should be considered, while the sewerage plan recommended

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by the city's consulting engineer should be implemented as soon as possible. Further, and if possible, agreements should be reached for receiving sewage from future developments both in McIntyre and Neebing Townships.

If the micro-strainer which is presently being tested by Port Arthur proves to be beneficial in removing gross suspended solids from the water supply, these units should be installed at the pumping station. An ultimate objective for removal of turbidity and finer particles would be the installation of filters.

The Port Arthur water/distribution system should be reinforced with more large diameter feeder mains and elevated storage, and the sewerage program outlined in the report by the city's consulting engineer should be implemented as soon as possible. Among other things this will involve the elimination and prevention in the future of storm water from the sanitary sewers and the development of a separate storm water sewer system.

The trunk sewers in Port Arthur should be designed to receive sewage from some of the future developments in McIntyre Township, the report states.

Also, a thorough investigation should be made of the large amount of non-revenue water (45%), which is pumped in Port Arthur.

On the basis of the limited well records that are available and the experience of the local population, it is felt that ground water cannot be considered as a suitable source of supply for anyconcentrated development in the area.

The two sources of future surface water supply in the area will be Lake Superior or the Kaministikwia River. Either source will give an adequate quantity of good quality water for municipal purposes, but a supply from the river would require a full treatment plant, whereas a properly located intake on Lake Superior would provide water which would require nominal treatment. The decision will therefore be based on cost to a considerable extent.

The other watercourses in the area do not have sufficient year-round flow for their development as a municipal supply. For this same reason they cannot be considered as effective for receiving sewage treatment plant effluents without a high degree of treatment.

The report suggests that basic water supply and sewer agreements should be made between the Township of McIntyre and Port Arthur and between the Township and Fort William, with similar agreements between Neebing Township and Fort William. For the Township of Paipoonge, the report recommends that if the private wells in the area become contaminated by drainage from septic tank systems, a central sewage system should be developed. The most economical form of treatment would be by means of an oxidation lagoon.

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(Above abstract from the Ontario Water Resources Commission's Report on a Water Resources and Stream Pollution Survey of the Lakehead Area is for release at 12 noon, EST--1 p.m., EDT--Friday, May 1, 1959.)

PLEASE GUARD AGAINST PREMATURE PUBLICATION

--Thank You--

PULP AND PAPER INDUSTRY

REPORT

Ontario Water Resources Commission

Municipality Port Arthur Date of Inspection

Re: Abitibi Power & Paper Co., Mill Manager, G.A. Sutton.

Field Inspection by Millest and MacDonnell Report by

Details of the Mill

Production:	Newsprint	430 tons/day
	(a) Groundwood	330 " "
	(b) Sulphite	100 " "
No. of Employees:	388 hourly 46 salary	
Operating Schedule:	24 hours per day, 4 or 5 days per week (usually 5)	
	Barkers operate June to September (inclusive)	
Water Consumption:	13,500,000 Imp. G.P.D.	
	(a) Wood room	1,400,000 g.p.d.
	(b) Sulphite Mill	505,000 "
	(c) Paper Mill	4,100,000 "
	(drinking andsan. water from city)	
Raw Materials:	Barked Wood -	20,000 tons per month
	Pyrites	24,000 lbs. per day
	Sulphur	19,000 " " "
	Limestone	21,700 " " "
Waste Disposal:	Wastes are discharged to an enclosed area fronting the mill yard where most of the solids are settled and retained.	

Comments

Mr. Sutton emphasized the difficult position of the Lakehead mills in respect to high wood costs, pointing out that production at his mill was now only 75% of mill capacity. A recent policy of the parent com-

pany is to increase production at their low wood cost mills elsewhere while limiting the operations of the higher cost mills, as at the Lakehead. This is a matter to be considered in pressing for wastes disposal improvements in the Lakehead area. The parent company may not wish to undertake costly waste control programme.

The waste settling area, (described in the report of September, 1958) was found to be almost completely filled by settled solids in April this year. In addition, an area of some 75 yards radius beyond the overflow of the settling pond had also been filled. It is quite evident that the area devoted to solids settling is inadequate, it should be enlarged and cleaned more frequently than is presently done. Past practice has been to clean out the settling area and dump the solids along the shore to the west of the mill. This has resulted in a tremendous accumulation of bark and fibre solids that probably continually washes into the lake. It would seem that the most pressing problem at this mill, as perhaps at the other mills in the area, is the retention of these solids, that now build up in the harbour area. This is a problem that should be handled by the mill staff. The additional problem of spent sulphite liquor disposal and the presence of phenols in the mill waste are matters that might have to be considered by the research division of the company at Sault Ste. Marie. In any case the matter will probably have to be referred to Mr. R.E. Hayes, manager of manufacturing (newsprint) at the Abitibi head office in Toronto.

Wastes to be Considered

1. Spent Sulphite liquor (B.O.D.)
2. Solids control - fibre and bark.
3. Phenols (slimicides, or other sources)

CONCLUSIONS

1. Mill is operating at high efficiency - white water return makes possible total fibre loss of less than 1%.
2. Sanitary wastes discharged to septic tank and tile bed.
3. Hope for direct logging head to reduce wood costs.
4. Loose bark is recovered and burned.
   Great quantity of fine bark in settling area. All shoreline covered with it, shelving out into bay and therefore awash along shore.
5. No recovery or re-use of spent cooking liquors.

Recommendations

1. Improve the control of bark by:

   (a) More efficient screening at wood room (Sveco or other screen)

   (b) Enlarging settling area, thereby reducing velocity of waste flow and permitting more efficient settling and retention. The settling area should be cleaned frequently to maintain its capacity.

   (c) As an alternative to (b), provision of mechanically cleaned sedimentation chambers.

2. Refer the study and control of chemical wastes (spent sulphite liquor, slimicides, etc.,) to Co's Research Div.

REPORT

Ontario Water Resources Commission

Municipality Port Arthur — Date of Inspection April 13, 1959.

Re: Provincial Paper Co. Ltd., Mr. E. G. Pallister, Mill Manager.

Field Inspection by Millest and MacDonnell. — Report by

Details of the Mill

Type of Mill: Sulphite and groundwood mill producing fine paper.

Production:

Sulphite pulp	75 tons/day	(80% is bleached)
Groundwood	50 "	"

No. Employees: 550 hourly
35 to 40 salary

Operating Schedule:

Sulphite Mill	-	24 hours/day	-	4	days/week.
Groundwood Mill	-	24 "	"	6	" "
Paper Mill	-	24 "	"	6	" "

Water Consumption: 16,600,000 Imp. Gallons per day.

(a)	Groundwood Mill & Woodroom	- 850,000 g.p.d.
(b)	Sulphite Mill	- 10,300,000 g.p.d.
(c)	Paper Mill	- 5,450,000 g.p.d.

All process water pumped from Thunder Bay, screened on North rotary filters and chlorinated.

Raw Materials: (July, 1958)

Limestone	- 660,000	#/month	- 34,500	lbs./day
Sulphur	- 338,800	"	17,800	" "
Chlorine	- 91,188	"	4,800	" "
Lime	- 44,192	"	2,300	" "
Caustic	- 24,000	"	1,260	" "
Alum	- 178,176	"	6,600	" "
China Clay	- 2,600,000	"	96,500	" "

Comments

Impoundment of settleable solids was discussed during this visit (April 13, 1959). An area of some 4 or 5 acres is available for this purpose at the waterfront of the mill property. This area could probably serve the purpose for the pulp mill and the paper mill if provision for frequent solids removal (e.g. for land disposal) could be made. The wood room sewer, which discharges to the north-east of the plant area facing the Abitibi Thunder Bay mill, could be served by a separate impoundment area.

The disposal of wastes in general, at the Provincial Mill was described in a report of a survey made in September, 1958. As at the Abitibi mills, the entire matter would probably have to be referred to the Head Office in Toronto. Provincial Paper, Limited, is a wholly-owned subsidiary of Abitibi. Management contact at Head Office would be H. G. O'Leary, Manager of Manufacturing, Fine Papers, and, through him, the Research Division of Abitibi at Sault Ste. Marie.

Wastes to be Considered

1. Suspended solids - Fibre, bark and china clay.
2. Spent sulphite liquor.
3. Phenols (See letter from Mr. O'Leary).

CONCLUSIONS

1. Sanitary wastes should be excluded from mill wastes and sewered, to town or septic tank.
2. Settling basins -
   (a) Pulp and Paper mill wastes:-
   four to five acres are available, and should be enclosed more efficiently.
   (b) Barking and Woodroom wastes:-
   could be impounded separately to north of mill area.
3. White Water Circuit. A $90,000 installation expenditure for an American filter is planned so as to close the white water circuit and appreciably reduce fibre loss.
4. A new logging road is proposed to truck wood forty miles from the bush. This should lower wood cost.

Recommendations

1. Impoundment of wastes to remove solids. (Item 2, above)
2. No feasible way of handling spent sulphite liquor - need research.
3. Sources of phenols not clear - This aspect of problem requires a detailed follow-up survey.

REPORT

Ontario Water Resources Commission

Municipality Fort William — Date of Inspection

Re: Abitibi Power & Paper Co. Ltd., Mr. C. T. Anderson, Mill Manager.

Field Inspection by Millest and MacDonnell — Report by

Details of the Mill

Production:	Newsprint 230 tons/day (a) Groundwood 193 " " (b) Sulphite 37 " " (Mill rated at 245 tons/day)
No. Employees:	260 hourly 45 salary
Operating Schedule:	24 hours per day 5 days per week (barkers operated in summer only)
Water Consumption:	Process Water from Mission River: 4,250,000 to 5,000,000 g.p.d. 60. mesh screens and chlorinated; sanitary, boiler-feed and fire sprinkler water from munic.
Waste Disposal:	Bark is discharged to an enclosed area behind a breakwall to the east of the mill. The pulp and paper mill sewers discharge to an open ditch and thence to the bark disposal area. Sanitary wastes: Office to septic tank Mill to Mill sewers.

Comments

Mr. Anderson reiterated the statements of Mr. Sutton at the Port Arthur mill re high wood costs. He said the Fort William mill was in a more precarious position than the Port Arthur mill and only the high-yield sulphite process was keeping the mill in operation. (The high-yield sulphite process is a modification of the conventional sulphite process, employing a weaker acid and a shorter cooking time. More mechanical separation of the fibres is required).

The effects of wastes from the Fort William mill are more confined than is the case at Port Arthur. The impoundment area to the east of the mill appears to be quite adequate for retaining solids. All pulp mill wastes are also discharged to this impoundment area where their effect is probably cushioned before they reach the lake. Waste disposal at this mill could be an important consideration, however, should Fort William wish to develop a municipal water intake in the vicinity.

Follow-up on this problem should be through Mr. Hayes, Manager of Manufacturing (Newsprint) at the Abitibi head office in Toronto, and through the Abitibi research division at Sault Ste. Marie.

Wastes to be Considered

1. Spent Sulphite liquor (B.O.D.)
2. Solids control - fines and bark.
3. Phenols (slimicides, or other sources).

CONCLUSIONS

1. According to Anderson, high wood costs make continued operation of the mill most difficult - He is searching to increase efficiency. The high-yield sulphite process alone is not enough. All wastes now sewered to semi-impoundment area.
2. Pulp and Paper mill wastes to area south of break wall and thence to east of mill (through gap in wall to Thunder Bay).
3. Bark to south half of the same impoundment - bark shelves off to east to Thunder Bay.
4. Situation not as bad as at Port Arthur mill, unless Fort William plans water intake in vicinity.
5. Hope for logging road to reduce costs.

Recommendations

1. Require feasible way of handling Spent Sulphite liquor - need more research.
2. Phenols require more detailed follow up study.

REPORT

Ontario Water Resources Commission

Municipality Fort William — Date of Inspection

Re: Great Lakes Paper Co. Ltd. Mr. C. J. Jeffery, Mill Manager.

Field Inspection by Millest and MacDonnell — Report by

Details of the Mill

Production:	Newsprint 360,600 tons per year Sulphite pulp in addition to that used in newsprint 20,000 tons per year. (Newsprint runs between 850 and 900 tons per day - Mill now rated at 1100 tons/day - 300 tons sulphite per day).
No. Employees:	Mill 1025 (max) Office 75
Operating Schedule:	24 hours per day, 6 days per week when shipping open. 5 day week when shipping closed.
Water Consumption:	5 x 6500 45 g.p.m. pumps from Kam River - usually 3 or 4 operating at a time, although total capacity may be required now as new paper machine is in operation (28.8 M.G.D. cap.) Remove silt in spring by floculating with silica and settling in two - ninety foot diameter settling basins - sludge discharged to river.
Raw Materials:	Wood - 1600 cords per day (expect to increase to 400,000 cords per year). Limestone - 330 # per ton sulphite pulp Sulphur - 225 to 330 # per ton " Alum - approx. 8 lbs. per ton total prod.

COMMENTS

In discussion with Mr. Jeffery, Mr. Jorgensen, Plant Engineer and Mr. Irwin, Chief Engineer, it was learned that the sanitary wastes from the 1,025 employees are discharged in the mill waste effluent. The new Fort William interceptor sewer will locate close to the mill. Mr. Jeffery was advised that the sanitary wastes should be sewered to the City sewers or suitably treated. He agreed to investigate the matter.

There is a bark disposal, burning arrangement, which appears to control the major bark disposal problem. A determination of the efficiency of their white water system was not made. A large quantity of bark shreds would pass down the Kam River from their log ponding area at the jackladder. The vast water consumption renders the problem of treatment of spent sulphite liquors and fines, a most difficult problem.

An informal discussion was later held with the president, Mr. C. J. Warwick Fox and his Vice President, K. A. Miners, in the cafeteria, where we were introduced casually. As Mr. Fox does not usually have coffee in the employees' cafeteria, it would appear that the meeting was arranged. We explained to Mr. Fox that this was a courtesy visit by the Commission to review, in general terms, the pollution problems of the various mills at the Lakehead and to advise that consideration should be given to the control of mill wastes in the future. We were informed that this company has retained E. & B. Cowan, Consulting Engineers, 5460 Patricia Avenue, Montreal, as advisors on mill efficiency and on waste control.

Wastes to be Considered

1. White Water control.
2. Spent Sulphite liquor.
3. Phenols.
4. Sanitary wastes.

CONCLUSIONS

1. Sanitary wastes from 1100 employees to be sewered to new interceptor sewer.
2. Bark from log ponding at the jackladder, should be better controlled, to prevent escape of bark shreds down the Kam River to the lake.
3. The mill is located, partially over the river, with some sewers flushing directly into it. A major problem will be the sewering required to isolate and re-direct these wastes for general collection and control.
4. The confining effect of the river, which receives the mill wastes (28.8 M.G.D.), makes the impact of these wastes on the receiving waters much more serious, than is the case with other Lakehead

mills discharging direct to Thunder Bay.

5. More knowledge of the escape of fines in the white water and the bark affluents is desired by the Commission.

Recommendations

1. A more intensive survey of this mill is required.
2. Research made on Spent Sulphite liquor problem.
3. Sources of Phenol to be determined.
4. Control of solids - bark, fibre.

GRAIN ELEVATORS

REPORT

Ontario Water Resources Commission

Municipality Fort William — Date of Inspection

Re: Ogilvie Flour Mills, Ltd., (Starch Plant), Fort William, G.L. McArthur

Field Inspection by Millest and MacDonnell — Report by Divisional Manager.

Details of Elevator:

Production:	Wheat Starch - 3,000 pounds per hour Gluten - 17,000 " " day Middlings (grain residue after processing)
No. Employees:	43
Operating Schedule:	24 hours per day 5½ days per week
Water Supply:	Municipal (Fort William)
Waste Disposal:	Industrial: Starch plant waste to Kam River - 3,500 gal. per hour (84,000 g.p.d.) Sanitary to Kam River (untreated)
Raw Materials:	1,100 bags whole wheat flour per day

Comments

The objectives and undertakings of the OWRC in the Lakehead area were discussed to indicate to Mr.McArthur the need for the control of industrial wastes in keeping with a programme of pollution control through the treatment of municipal wastes.

Three possible approaches to the handling of starch plant wastes were discussed.

(1) Discharge to sanitary sewer - this presents a loading problem since the B.O.D. was measured at 28,100 p.p.m. last fall. With a flow of starch plant waste of 84,000 g.p.d., a loading of 23,604 pounds of B.O.D. per day would have to be handled by a

sewage treatment plant. The wastes would have a sewered population equivalent based on B.O.D., then, of 140,000. Suspended solids are also high, at 11,760 p.p.m. (recorded in September, 1958). Discharge to the sanitary sewer could, therefore only be made with the loading evaluated and provision made for adequate treatment capacity at the municipal sewage treatment plant.

(2) Evaporation and drying for recovery of solids.

(3) Recovery of solids by centrifuging.

Note: - Evaporation would eliminate the waste whereas centrifuging would leave a more acceptable waste for sewage treatment.

Wastes to be Considered

1. Starch wastes.

2. High B.O.D. loading.

3. Sanitary wastes not now sewered. Determine location of interceptor sewer for connection to mill.

4. The possibility of sewering their entire waste was discussed. We advised discussion with the city engineer re the rated capacity of the system being installed for the city.

5. Actions for correction of effluent will be directed by Mr. J. B. Sullivan, Manager, Starch and Chemical Division, Ogilvie Flour Mills, Sunlife Building, Montreal.

6. Dr. Kenneth Gaber, Director of Research, now has Dr. Alan Eisenbraun working on the effluent problem.

7. Mr. McArthur promised a history of actions taken to improve their effluent in the past few years.

8. This mill will likely co-operate to the full extent in order to prevent inspection of their mill.

CONCLUSIONS

This mill operates on secret process data. They are most reluctant to have an inspection of their mill, to prevent the possible escape of processing information of vital interest to competitors. They are even reluctant to have their effluent analyzed.

Recommendations

1. That reports be obtained rom them regularly re the B.O.D. loading of their effluent.

2. That the mill discuss sewering of sanitary wastes and possibly mill wastes with the City of Port William. This latter (mill wastes) would have to be carefully considered.

3. That the Company prepare a statement of procedures on research re their mill wastes.

4. That the Company report regularly on improvements made concerning research on wastes.

OTHER INDUSTRIES

REPORT

Ontario Water Resources Commission

Municipality Lakehead Date of Inspection

Re: Northwestern Ontario Timbers Operators Association, H. A. Hallonquist, Manager.

Field Inspection by Report by

The purpose of this discussion was to determine the general possibilities of bark disposal methods on an economical basis for the pulp and paper industry at the Lakehead.

At present, most of the wood supplied to the mills is water-borne and towed in log booms. It is transported to Thunder Bay via River log drives. Naturally considerable bark is lost in the bay while the log booms are water-borne. The action of the waves cause considerable grinding of the logs. It is estimated that perhaps 60% of the bark is removed in this manner, i.e. river drive and boom storage.

Mr. Hallonquist is conversant with the economics of forest harvest logging techniques. He doubted that the economics of bark removal in the bush were compatable with present wood costs delivered at the mill. The following methods of bark removal in the bush have been demonstrated by various companies:

1. Cambio Barker - cost approximately $30,000 per machine production low (same as now used by the Wood Preservers Ltd.)
2. Veikko Barker Manufacturing by Forano cost approximately $50,000 production low.
3. More-Bark - Statistics and cost unknown.
4. Drum Barker - similar to those now used in the Pulp mills.
5. Flail Barker - cost and statistics not available, sometimes used by Abitibi at Iriquois Falls.
6. Spruce Harvester Manufacturing by Hiabob Hydraulics, Ely, Minn.
7. Chemical de-barking - Ontario Paper Company - Heron Bay.

CONCLUSIONS

1. The transfer of mill barking costs to the woods operation will likely be resisted by the Woods Manager.
2. The Barking of logs at the forest site would represent a freight haulage cost saving of 20% by weight.

3. Barking at the forest site with subsequent drying of the wood would reduce the specific gravity of the log and thereby increase buoyancy, and would save some of the present log sinkage occurring during boom storage rated to be between 1 and 5%.

4. The bark burning problem at the mill which is more usually considered economic now by mill managers would be eliminated.

5. The costs per cord of wood at the Lakehead $30-$32.
Costs per cord of wood in Quebec $22-$26.
Costs per cord of wood in Newfoundland $16-$18.

The foregoing costs illustrate the problem of high wood costs at the Lakehead which primarily predicates the ability of the mills to undertake effluent improvement and still maintain a competitive position in the newsprint and fine paper market.

Recommendations

1. This Commission should encourage research and discussion into bark disposal methods at the forest site with a view to achieving the introduction of peeled logs to Thunder Bay woods, thus eliminating future heavy bark sediment in the Bay from log booms.

2. The new logging road under active consideration by the Abitibi and Provincial Mills might well encourage the companies to debark at the forest site, thus saving 20% transportation costs by waste.

3. The bark problem in Thunder Bay is a most difficult one, because of economics. Further exploratory talks with the industries concerning the utilization of bark and fines by the Murray Brantford Roof and Felting Company should be encouraging.

REPORT

Ontario Water Resources Commission

Municipality Port Arthur Date of Inspection April 13

Re: Lark Pool #7, Mr. L. A. Hurrel, Superintendent

Field Inspection by Millest and MacDonnell Report by

Details of the Elevator

Type of Elevator: Grain

Production: Largest at Lakehead

No. Employees: 175 (at Peak)
57 (approx) full time

Water Consumption: 1957 - 98,000 cubic feet
1958 - 69,000 cubic feet

Raw Materials: Wheat

The sifting and cleaning of wheat produces a quantity of buckwheat, cockle and other parasite grains often found growing with wheat, also assorted debris of stones, wood and paper accumulated during transfer of the wheat from the field, to box cars, to ship holds, to elevator.

Comments

This elevator is the largest operating at the Lakehead, and was chosen to determine what problem, if any, exists in the twenty-six elevators being operated in the Lakehead. It is felt that the results of the inspection of this elevator would be relatively similar to all other elevators at the Lakehead, except where there was special processing of the grain as at the Canada Malting Company elevator, two north of this elevator. (Canada Malting was previously inspected by Millest and found to be producing a steep-water effluent that might well be investigated further. (However, if a problem does exist here, it would be difficult to suggest just what solution there might be.)

The following grain elevators at Port Arthur are listed as being fairly representative of this industry at the Lakehead, all using municipal water and creating a sanitary sewage problem, somewhat proportional to the number of persons employed. It is understood that sanitary wastes from all twenty-six elevators are discharged untreated to the surrounding waters of the bay or the Kam River.

Sask Pool #6	Number	of	persons	employed	- 140
Manitoba Pool #3	"	"	"	"	75
Stewarts	"	"	"	"	50
Sask Pool #7	"	"	"	"	175
United Grain Growers	"	"	"	"	35
McKabes	"	"	"	"	60
Parish & Heinbecker	"	"	"	"	20
Manitoba Pool #1	"	"	"	"	40

The elevators at the Lakehead operate mainly during the shipping season. The main functions include receiving, cleaning, sorting, storing and shipping grains. (Total: 275,000,000 to 300,000,000 Bu. per year). There is an acute dust and chaff problem. Course screenings and chaff are collected and sold as animal fooder. Dust is collected throughout the elevator operations and is removed in cyclone separators as an explosion prevention measure. Since the cyclones were first instilled for this purpose only, little or no thought was given to ultimate disposal, and as a result the dust was permitted to escape to the air, ground and water. In one instance, during a previous aerial inspection Millest observed quantities of chaff, etc., from one mill being discharged to the surrounding waters. It is not known to what degree fine dusts and chaff are thus disposed by all mills. Sask Pool #7 is now preparing a blower conveyance system to locate all dust at the inland terminal of their wharf. From there it will be trucked and disposed of on land.

Wastes to be considered

1. Dust, stones, wood, and other debris
2. Sanitary Sewage facilities
3. Dust collection and proper disposal on land rather than escaping, or being discharged to surrounding waters.

Conclusions

1. The average water consumption per person at Sask Pool #7 was 40 gallons per person per day.

2. There will be great difficulty in sewering to the Municipal System the sanitary wastes; or in finding space for septic tanks on the property of each elevator due to low lying nature of land (approx. 18" above water table).

3. Apparently Sask. Pool 7 is the only elevator now proceeding with satisfactory dust collection and disposal. The discharge of chaff and dust from 26 elevators to the air and water would certainly be significant.

4. Because of the unknown factors, a complete industrial waste survey of the 26 elevators should be carried out.

Recommendations

1. Sanitary sewage disposal facilities should be provided, perhaps by septic tank as there are no sanitary sewer facilities close to these mills, the mills being located generally on piers projected into the water.

2. Prevention of screenings and dust now being dumped into the water.

graphic Survey Corporation Limited.

If you have never visited Port Arthur it will give you a better idea of our location, our facilities for the production and treatment of timber, the production of creosote oil, roofing pitch, pipe enamel pitch, and carbon coke as well as a visual idea of the inventories which are ready for immediate shipment by rail, boat or truck from our Port Arthur Plant.

Would you be good enough to make a note of our new Port Arthur telephone number 4-8451. Our Toronto office number is EMpire 4-6377 and our Prince Albert number is ROger 3-2687. We also have a timber operation at Prince George, British Columbia where the number is LOgan 4-2327.

We will look forward to hearing from you at any time we can be of service.

NORTHERN WOOD PRESERVERS LIMITED

Canadian Post Card Co., Ltd., Toronto 3

GIANT POST CARD

Address

14580-B

REPORT

Ontario Water Resources Commission

Municipality Port Arthur Date of Inspection April 13th, 1959

Re: Northern Wood Preservers Ltd, General Manager Mr. S.F. Mack, Millest and

Field Inspection by MacDonnell Report by

Details of Plant

Production -	Railway cross-ties, lumber, and hydro poles and treatment of same with coal-tar derivatives and pentachlorophenol.
No. of Employees	300
Operating Schedule	Slasher mill, barker, and sawmill: 8 hours per day, 5 days per week. Distillation and wood preserving: 24 hours per day, 5 days per week.
Water Consumption	Process: 600 to 800 gpm (U.S.) from Port Arthur Harbour. Drinking, sanitary, etc. from Port Arthur municipal supply.
Waste Disposal	Process water to Port Arthur Harbour Sanitary sewage to septic tank. Sawdust collected and burned Bark used as land fill.
Raw Materials	Wood supplied to plant as rough logs. Coal tars (From Steel industry) (used 654,000 gallons Creosote in 1957) Pentachlorophenol
Production	Lumber: 10,000,000 to 12,000,000 feet per year (handle up to 20,000,000 feet in planer). Preserved wood: 3,000,000 cu. ft. per year. 90 percent of which is ties and poles Coke: 3,000 to 4,000 tons per year Heavy Creosote Oils: 250,000 Imperial gallons sold in 1957. Creosote: 654,000 gallons for own use in 1957. 650,000 gallons shipped to Prince Albert plant in 1957.

Comments

Provision is being made for the collection and disposal of oily-water wastes. A yard lay-out drawing supplied by Mr. Mack indicates that all liquid wastes from the area in which the preserving chemicals are prepared and applied are to be collected, skimmed, and pumped inshore on the company property for final treatment. It is recognized that final treatment of this waste will almost certainly present a problem for which we do not now have the answer. All we can do is go along with this first plan of the Northern Wood Preservers and at the same time follow development elsewhere (for example, Trenton, Ont.) Mr. Mack spoke of attending a conference at Dallas at which a paper dealing with the treatment of such wastes was to be given to the American Wood Preservers Association.

Bark and sawdust pollution should also be considered in any future field surveys.

The American Wood Preservers Association in New York forwarded information given at the Dallas conference to R.H. Millest subsequently.

Wastes to be considered

1. Oils and Phenols recovery

2. Sawdust and bark-recovery and disposal

3. Sanitary Wastes are discharged to a septic tank in all but two buildings (to be corrected.)

Conclusions

1. The present preserving chemicals of coal tar derivatives and pentachlorophenols are escaping in quantity.

2. Catch basin and pump is being installed in the wood-preserving area to deliver wastes inland to a recovery or treatment area to be built subsequent to obtaining a suitable treatment method. (See Dominion Tar & Chemical Co. Ltd. - Hamilton)

3. Boiler house and creosote plant sanitary sewage to be sewered to septic tank.

4. Wood barker and slasher on stilts over water - some bark and sawdust now being discharged to water, majority being trucked and bull dozed for land fill-properly contained by a wall at water front.

RECOMMENDATIONS

1. A further survey to determine efficiency of oil wastes recovery system.

2. Correction of sanitary sewage discharge.

3. Correction of bark and sawdust losses from Barker and Slasher.

REPORT

Ontario Water Resources Commission

Municipality Fort William Date of Inspection April 14, 1959.

Re: Husky Oil and Refining Co. Refinery Superintendent, Mr. Dean Stevens

Field Inspection by Millest and MacDonnell Report by

Details of the Mill

Production:	Premium and regular grade gasolines, heating fuels, Bunker "C" and asphalt
No. of Employees:	54 hourly 17 Supervisory and office
Operating Schedule:	24 hours per day, 7 days per week (average 28 days per month)
Water Consumption:	- Approx 850 g.p.m pumping capacity (12 M.G.D) - using 500 g.p.m in 1958 - pumped from McKellar River - drinking water carried by tank to plant from Fort William
Raw Materials:	3,800 barrels per day Western Canadian crude oil
Waste Disposal:	500 g.p.m to waste ditch, to standard A.P.I separator and thence to McKellar River and to Thunder Bay.

Comments

The A.P.I. separator described in the report of September 1958 has been completed except for some small parts. The company expects to bring the separator into service this spring. Cost of the total installation has been just over $18,000. Mr. Stevens intends to photograph the separator before it is used and send copies of the photographs to us.

As pointed out in the report of last September, the only significant source of phenols is the mild caustic wash prior to reforming, and unless the company goes into catalytic cracking there should be no serious problem.

The company has set aside an area on the north side of island No. 1 (on which the refinery is located) for receiving ballast from ships carrying oil to or from the refinery.

Wastes to be Considered

1. Cooling and process waters carrying oil and phenols

CONCLUSIONS

1. This operation appeared to be under control.

2. Mr. Stevens appeared well informed on waste recovery process and was most co-operative.

3. A waste recovery process (A.P.I Separator) was to be installed. The previous system of waste recovery was quite primitive, but remarkably effective to visual inspection, and was previously sampled by Millest with low results.

4. When the A.P.I separator is completely installed and operating it should give adequate oil removal treatment to the discharging wastes. (It will not control phenols or other water-soluble waste components.)

5. Mr. Millest has subsequently obtained a photo record of the A.P.I Separator in stages of construction for future reference purposes.

Recommendations

1. That the Plant be inspected from time to time to ensure that the waste disposal system is operating efficiently and that the level of phenols in the effluent is not excessive.

SUMMARY INDUSTRIAL WASTE LAKEHEAD

REPORT

ONTARIO WATER RESOURCES COMMISSION

Re: Highlights of Industrial Wastes Problem at Lakehead.
(See attached report, R.H. Millest, Sept./58 for details(attached)

Total water-use of 13 major industries, excluding dairies, bottling plants, and grain elevators, is approximately 76.5 M.G.D. (compared with approximately 12 M.G.D. for two cities)

Sewered Population Equivalent (BOD) of four pulp and paper mills in Lakehead: approximately 1,235,000.

Solids deposition:

(a) Fibre - approximately 30 tons per day, based on loss of 1.5%.

(b) Bark, china clay, etc. would be much in excess of fibre loss.

(c) Grain solids - no evaluation made, but is expected to be significant.

Grain handling, storage, etc.

--275,000,000 to 300,000,000 Bu. per year, in 26 elevators (4 in each city)

Sources of Phenols, etc.

1. Northern Wood Preservers (Port Arthur)
2. Pulp & Paper Mills (slimicides etc.)
3. Husky Oil & Refining Co., Ltd. (Fort William)
4. Koppers Corp. Ltd. (Port Arthur) - only if a spill occurred.

Conclusions

Stimulation of Lakehead Pulp and Paper Effluent Committee to investigate:

1. Utiligation of fines and bark for Commercial use
2. Debarking of wood in forest.
3. Treatment of spent Sulphite Liquors.
4. Treatment of other chemical waste components, eg. phenols, dyes, china clay, etc.
5. Elimination of further bark from Thunder Bay.

CITY OF PORT ARTHUR

REPORT

Ontario Water Resources Commission

Municipality City of Port Arthur Date of Inspection April 14th

Re: Older Sewers in the Town by Mr. T. Fell, City Engineer

Field Inspection by _____ Report by W. S. MacDonnell

Problem

In discussion with Mr. Fell he stated that some of the laterals, particularly from the Northeastern subdivision, are overloaded. Some of them are combined sewers. Council shrinks from the obvious expenses involved in its correction.

As overloading occurs from time to time, cellars become flooded and complaints become numerous.

We would greatly appreciate your advice on the following:

1. What inexpensive or temporary adjustments can be undertaken to relieve overloading.

2. What overloading can be anticipated with respect to various sized laterals connected together, i.e. older, smaller ones and larger, newer ones connecting from above them.

3. How to estimate costs and overloading potentials.

DRYDEN PULP AND PAPER

ONTARIO WATER RESOURCES COMMISSION

DRYDEN PAPER COMPANY

Vice President and General Manager: J.W. Wing

Mill Manager: T.S. Jones

Re: Report by R.H. Millest:

See Pages 3 and 4 - Alerations and Expansion Since 1954

" " Operating Data

" " Summary of Sewer Data

General Summary

The impact of industrial wastes on the Wabigoon River had created some taste producing problems that adversely affected the commercial fishing interests of a Mr. Walter Booi. The Kenora Resort Operators' Association have been greatly disturbed by this taste factor in the water. Some resort operators claim it could be traced some 90 miles downstream.

It was felt that Mr. Booi was being unfavourably handled by the company with respect to settlement of commercial fishing damages. This was arousing the Association to militant action. It is understood that the Booi problem has since been settled by the company to Mr. Booi's satisfaction.

There has been no satisfactory determination of the waste effluent that is causing the taste problem. Millest recommends investigation of the use of the carbon filter technique.

Discussion was held with mill officials concerning the possibility of selecting the most objectionable wastes for lagooning to the west of the mill on company property. Mr. Wing was to investigate this further.

It is obvious that mill efficiency can and will be further improved according to their list of proposed activities forwarded in a letter by Mr. J. B. Robinette to Mr. D. R. Walkinshaw, (see attached).

Mr. T.W. Beak, Biologist, is continuing his stream-bottom study techniques again this year under company direction, and is applying bio-assay in the determination of taste in the flesh of the fish..

Conclusions

See pages 17 to 23 of Millest's report of September 7, 1958 attached.

Recommendations

See Pages 24 to 26 of Millest's report of September 7, 1958.

DRYDEN: PULP & PAPER CO. 1959

Mc CARTHY & Mc CARTHY

C
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Y

February 9th, 1959.

Without Prejudice

D. R. Walkinshaw, Esq., Q.C.,
Messrs. Roebuck & Walkinshaw,
Barristers and Solicitors,
372 Bay Street,
TORONTO, Ontario.

Dear Mr. Walkinshaw: Re: Booi et all and Dryden Paper Company

Mr. Weiler and I have had an opportunity this week to consider further the problems which we discussed in your office last Thursday and I am now writing this letter entirely without prejudice to the rights of our respective clients.

As to Gilliam it is clear that he has no riparian rights on any of the waters alleged to have been polluted and that any right to sporting fish which he might have is a right which he enjoys along with all other members of the public. Therefore, in our view, Gilliam has no legal claim whatsoever against Dryden Paper Company Limited.

As to the claim of Purcell, our inquiries at the Department of Lands and Forests disclose that Purcell has no land use permit or any other right to land on the shore of Clay Lake. Hence, Purcell is not a riparian owner on any waters alleged to have been polluted and, as in the case of Gilliam, any right to fish which he might have is enjoyed along with all other members of the public and gives him no cause of action. We, therefore, are of the opinion that Purcell has no legal claim against Dryden Paper Company Limited.

D. R. Walkinshaw, Edw., Q. C., February 9th, 1959.

As to the claim of Booi our search in the office of the Surveyor General indicates that Mr. Booi's property in the Township of Redvers is subject to a reservation one chain in width at the shore of Clay Lake and, therefore, Mr. Booi has no property interest in the lands which border on Clay Lake and is, in our view, not a riparian owner. We do not think that his commercial fishing license, which according to our information obtained from the Department, is not in any way a monopoly license, confers upon him any rights or property interest in available fishing in Clay Lake. We are, therefore, also of the opinion in Booi's case that he has no legal basis for a cause of action against the company.

However, in Booi's case we are, without prejudice and as a matter of good will, prepared to pay to Booi the sum of $2000.00 in consideration of a complete release by him and any subsequent owners of his property with respect to any injury caused by pollution past, present or future.

The Company is not interested in purchasing Mr. Booi's camp.

In part at least as a result of your representations, the company has made and proposes to make in the immediate future, improvements in its equipment and practices at the mill which will materially reduce any degree of pollution which may now exist.

I am setting our below the nature and dates of the improvements installed and to be installed by the Company. We have no objection to you showing the following list to your client, but, of course, as you will appreciate this entire letter is being written without prejudice to our rights.

The following is a list of the nature and dates

of improvements:

NATURE AND DATES OF IMPROVEMENTS

(a) 1949 -

$60,000 During 1949 a Sprout Waldron refiner was installed and knots and tailings were refined and saved instead of being flushed to the sewer. This reduced fibre to the sewer by about 7% of total production, or in 1950 it would have amounted to 3,360 tons.

$100,000 Rebuilt screenroom with increased re-use of whitewater and better saveall facilities resulting in a reduction of fine fibres going to sewer.

$160,000

(b) 1958 -

	1.	Wash-up practice improved.	May
	2.	Equipment inspection for leaks.	May
$1000	3.	Installation of automatic sewer sampler with continuous flow and soda loss measurement at main sewer. If a sudden increase occurs - source of trouble is tracked down and eliminated.	July
$500	4.	Mud filter feed control.	July
$1500	5.	Black Liquor filter.	August
	6.	Recovery chemical ash.	August
$125,000	7.	Black liquor storage capacity increase.	September.

(b) 1958 - (continued)

	8.	Foam handling procedures (not 100% effective).	September
$2700	9.	Evaporator condensate control.	September
$2500	10.	Soap skimming-off tank.	October
$42,000 /	11.	New Blow-down cyclone - loss in Blow-down condensate improved by 600%	October
$80,000	12.	Better control of practice of dumping stock to sewer from papermill beaters, chests, etc. during grade changes.	October
$10,000	13.	Installation of conductivity meters at all sewers to serve as warning alarms as to increased soda loss in sewer.	Oct.-Nov.
1000	14.	Increased wash and cook's liquor storage.	November
$50000/yr 30¢/ton.	15.	Control of the foam problem in the washers by chemical defoamer addition. This resulted in fuel oil elimination.	November
$5600	16.	Chlorine dioxide generator effluent to black liquor.	December
100000 /	17.	Installation of Save-all #2 P.M.	December
75000 /	18.	Closed white water systems #2 P.M.	December
$446200			

150
300
45,000

(c) FUTURE IMPROVEMENTS AND COMPLETION DATES

$800 1.	Piping to allow contaminated evaporator to be put in weak liquor storage tanks instead of sewering. This will only be requiring when evaporators starting up or having operating trouble.	January, 1959
$650,000 2.	Precipitator	February, 1959
$1,300,000 3.	Lime Kiln	April-May, 1959
$200,000 4.	Soap Skimmers &	March 1960

(d) OTHER IMPROVEMENTS UNDER ~~CONSTRUCTION~~ consideration

$1,150,800

$80,000 1.	Turpentine recovery system from blow-down condensate.	
$200,000 2.	Bark burning.	
280 000 3.	Improvement of green liquor dregs washing in causticizers.	

It is apparent that the Company is making every possible effort to correct any pollution that may now be taking place and I would think, on the basis of the above, that your client will appreciate that any pollution of Clay Lake will be materially reduced or eliminated in the near future.

Yours truly,

JJR/MR "John J. Robinette"

$2,237,000 $50000/yr Depreciation.

gram at the Dryden mill, started in 1959, was completed in 1958.

Capital expenditures for the year totaled $5,872,397, including $2,435,440 on the Dryden mill and $2,385,589 at the Quebec mill.

Here is a summary of production at the two mills:

	1958	1957
	Tons	
Quebec Mill:		
Newsprint	267,830	284,376
Unbleached sulphite pulp	40,866	45,551
Paperboard	21,041	21,840
Total	329,737	381,767
Dryden Mill:		
Bleached kraft pulp	74,977	34,885
Unbleached kraft pulp	17,753	18,338
Kraft papers and board	44,130	42,349
Total	136,906	92,672
Total, both mills	467,637	421,439

A noticeable improvement in markets occurred in late 1958, Mr. Soles says. This is expected to continue throughout 1959. Present industry expansion programs should be completed by the end of this year.

"We are confident that improving business conditions will be reflected in a reasonable improvement in earnings," the president says.

CONSOL. INCOME ACCOUNT

Years Ended Dec. 31:	1958	1957
	$	$
Net sales	58,807,699	80,994,290
Net earnings	13,554,973	11,466,900
Less:		
Deprec. & depl.	4,589,377	4,802,678
Interest	975,971	711,967
Income taxes	4,152,700	3,037,000
Minority interest		1768
Net profit	3,836,925	3,115,823
Less: Pref. divds.	421,308	431,078
Com. divds.	2,528,542	2,528,542
Surplus for year	887,075	156,205
†Loss.		
Earnings per Share and Dividend Record:		
Pref.: Earned	$25.46	$20.26
Paid	2.80	2.80
Com.: Earned	2.76	1.12
Paid	2.00	2.00
Shs. o/s as at Dec. 31:		
Pref., $50 par	150,612	153,762
Common, n.p.v.	1,264,271	1,264,271

CONDENSED CONS. BALANCE SHEET

As at Dec. 31:	1958	1957
Cash & govt. bds.	$5,642,757	$7,439,350
Accts., etc., rec.	8,390,308	7,896,072
Invent.	17,874,256	16,321,046
Prepaid exp.	343,980	409,554
Total curr. assets	32,250,301	32,066,021
Deferred chgs.	92,096	93,479
Pref. divd. main fd.	175,725	160,333
Excess cost over bk. val. subs.	3,327,172	3,327,088
Invests., assoc. cos.	1,296,968	1,411,048
Fixed assets*	41,919,230	39,853,987
Total assets	78,360,539	76,909,464
Due bank	3,100,000	3,970,000
Debt. instal.	550,000	550,000
Accts., etc., pay.	5,761,111	4,218,905
Inc. tax. pay.	2,336,363	1,817,275
Total curr. liab.	11,746,463	10,556,180
Deferred liab.		265,202
Funded debt	18,183,188	18,650,000
Min. int. in subs.		11,583
Capital stock	33,837,275	33,964,875
Capital surplus	377,136	381,130
Earned surplus	14,467,369	14,080,294
*After depr. & depl. of	46,325,367	44,708,302
Working capital	20,504,838	21,486,741

Contingent liab.—Commitments under contracts amounted to $1,150,000 as at Dec. 31, 1958.

Pulp and Paper

ANGLO-CANADIAN PULP & PAPER MILLS LTD., Quebec, Que., consolidated net profit of $3,836,925 for 1958 was 23.1% higher than 1957 net of $3,115,823.

Improved operating efficiency helped to increase earnings, reports President W. E. Soles, but discount on U. S. funds reduced revenues by $1,350,000.

Dryden Paper Co. sustained a loss of $530,721, compared with a $1,068,075 loss in 1957. Development pro-

REPORT

of

INDUSTRIAL WASTE AND STREAM POLLUTION SURVEY

DRYDEN PAPER CO., LIMITED

and the

WABIGOON RIVER

SEPTEMBER 7, 8, 9, 1958

ONTARIO WATER RESOURCES COMMISSION

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A survey of the disposal of pulp and paper mill wastes from the Drydon Paper Co., Limited, at Dryden, Ontario, was made on September 7, 8, and 9, 1958 to evaluate the sources and nature of wastes being discharged to the Wabigoon River, and to determine the degree of pollution existing in the river and downstream waters.

PERSONNEL

J. W. Wing, General Manager, Dryden Paper Co., Ltd.
D. H. Munsell, Mill Manager, " " "
R. M. Bishop, Development Supt. " "
Wm. Watson, Ass't to " " " "
Wm. Haveland, Ass't to Plant Supt. " "
Dr. O. J. Walker, Chief Development Engineer,
Anglo Canadian Pulp & Paper Mills, Ltd., QUEBEC CITY
R. H. Millest, Ass't Supervisor Industrial Wastes, OWRC
E. T. Ciebien, Industrial Wastes, Engineer, OWRC.

DESCRIPTION OF THE AREA

The Dryden Paper Co., Limited, is located on the west bank of the Wabigoon River in the town of Dryden, approximately 230 miles northwest of Port Arthur. The Wabigoon River flows north from Wabigoon Lake at Dryden, then westerly and northerly approximately 50 miles to Clay Lake and thence to Ball Lake in

DESCRIPTION OF THE AREA cont'd

the English River system, approximately 90 miles (by water) from Dryden. The upper drainage area, in the Dryden vicinity, is mainly clay, and flows through farmland in the twenty or thirty miles below Dryden, and then beyond that through mainly undeveloped, forested land.

PREVIOUS STUDIES

The severity of pollution that existed prior to this current survey was indicated by studies which were made in August, 1952, and September, 1954. A programme of mill renovation had been begun by 1954, and measures were being taken to minimize pollution by improving plant operation and installing new equipment for recovery of usable materials within the mill. Production had increased during that time from 160 tons of unbleached paper per day to 250 - 260 tons per day. The 1954 survey indicated that the increased level of production, and hence waste disposal, more than off-set improvements in the mill, as river conditions deteriorated with the expansion.

ALTERATIONS AND EXPANSION SINCE 1954

A large-scale programme of expansion was undertaken by the company, following acquisition of control of the plant by Anglo Canadian Pulp and Paper Mills, Limited, of Quebec City.

ALTERATIONS AND EXPANSION SINCE 1954 cont'd

Briefly, the major units that were either completely renovated or added to existing facilities were as follows:

1. Wood room - completely rebuilt on a new site south of the mill (upstream). Screens remove bark for discharge to a disposal area west of the mill.
2. Four new digesters, with production capacity approximately equal to that of the eight existing digesters.
3. Blow tank - for receiving pulp from the four new digesters, and two of the old digesters when required.
4. Brown stock washers - to remove black liquor from the pulp from the blow tank.
5. Cowan Screens and Centricleaners for screening and cleaning pulp from Brown Stock washers.
6. Bleach Plant (including Chlorine Dioxide generator)
7. Pulp machine - replacing one of the paper machines formerly in use.
8. Increased chemical recovery capacity, including a second multiple effect evaporator and a second recovery furnace.

Improvement has been made in handling black liquor for recovery, and in recovering the volatile by-products of cooking. Condensed digester vent gases, containing turpentines, are fed to the washers, where they are removed with the recovered black liquor. A resin acid soap skimming tank has been installed for recovery of soap for burning and/or sale. Salt cake losses, both to the sewers and to the atmosphere, are under current study.

ALTERATIONS AND EXPANSION SINCE 1954 cont'd

In general, the increase of production to 500 tons of pulp per day has been effected by the addition of completely new pulp mill equipment, in parallel with the old part of the mill.

DESCRIPTION OF PROCESS

Both bleached and unbleached Kraft pulp and unbleached Kraft paper are produced in the conventional Kraft or Sulphate process, in which cooking of the wood is done in a solution of Sodium Hydroxide and Sodium Sulphide. The economy of the process is based on the recovery and re-use of cooking chemicals, and the use of heat obtained in the recovery furnaces.

Briefly, the process at Dryden is as follows:

Wood Room:- Logs are received at the mill in 4-foot or 8-foot lengths, the 8-foot lengths are reduced to 4-foot bolts in the slasher mill, and then all the wood carried by conveyor to five wet-drum barkers, operating in parallel. The barked logs are carried by conveyor to either block storage in the yard, or directly to the chipper. Chips are conveyed to ground-level storage bins for future delivery to the digesters.

The bark that is removed from the logs is sluiced to a ravine west of the mill where it is retained. Drainage from the bark disposal area, consisting of all the water used in the wood room, returns to the Wabigoon River by way of a creek about half a mile below the mill.

DESCRIPTION OF PROCESS cont'd

Pulp Mill:- Pulp is produced and processed in two separate "lines", approximately 150 tons per day of unbleached product in the old mill, and approximately 330 tons per day (most of which is bleached) in a new addition to the plant. The two "lines" operate separately, except for a cross-connection from two of the old digesters to the new process, (to augment the bleached production when required), and the use of knots and rejects from the new mill in the old plant.

(a) Cooking in the old mill is carried out in eight digesters which are charged with approximately 10.5 tons of chips and 450 cubic feet of white liquor, yielding approximately 6 tons of unbleached pulp per 3-1/2-hour cook. With the exception of the charge of two digesters, which may be discharged to the blow tank, and thence to the bleach process, the old digesters are discharged to diffusers, in which the separation of pulp from black liquor is made. Fourteen diffusers are in use, operating in pairs. The effluent from a partially washed charge serves to wash a freshly-cooked charge, with the wash from the latter returning to the recovery plant. The pulp is washed until the wash water from the fresh charge is reduced from about 12° Bé to 7° Bé. It then receives fresh water which then serves to wash a succeeding charge. This secondary washing continues to 0° Bé, and for an additional 30 minutes, before the wash is sewered. The washed pulp is then carried to the screen room, through the refining steps, and finally to one of three paper machines.

DESCRIPTION OF PROCESS cont'd

Pulp Mill:- cont'd

Two diffusers, in addition to the 14 used as above, are used to wash the rejects from the knotters at the head of the Brown Stock Washers, and send them on into the unbleached pulp and paper process.

(b) Cooking in the new part of the mill is carried out in four 4500 cubic feet digesters, each charged with 22 tons of chips and 900 cubic feet of white liquor, and yielding 12.5 tons of unbleached pulp per 3-1/2-hour cook. In both the old and new digesters, relief gases are passed through a condenser and the condensate sent to the 3rd Stage Brown Stock Washer for recovery with the black liquor. The cooked pulp from the new digesters is discharged to a blow tank (rather than to diffusers, as in the old plant) and thence to further processing. At the end of the cook, pressure in the digesters is reduced to about 100 psi, and the charge then blown to the blow tank. Blow gases are passed through a condenser (with relief gases) for recovery of volatiles. The pulp charge enters the blow tank through a cyclone separator, to trap fibre and black liquor entrained in the digester gases.

Separation of the pulp and black liquor from the blow tank is made in four-stage, countercurrent, rotary drum, Brown Stock Washers. The unwashed stock from the blow tank is first passed over 3 knotters, with the rejects going to two diffusers in the old plant (see above), then through the four-stage washing, in which fresh water is fed to the showers of the fourth stage

DESCRIPTION OF PROCESS cont'd

Pulp Mill:- (b) cont'd

washer, the effluent from that washer serving the third, and so on until the effluent from the first stage (fresh pulp) is sent to the Black Liquor recovery plant. Each washer is served by a wash water chest, or storage tank, located beneath the washer. Since there is normally no effluent to the sewers, any fibre in the liquor leaving the first stage is carried to the recovery plant for removal by screening there.

Foam is drawn from the washer chests to a foam tank equipped with mechanical foam breakers. Liquid from the foam tank is sent to the recovery plant. The hot exhaust of vapours from the foam tank is sent to the sewer along with a small flow of clean water. The resultant temperature of this flow (some 30 to 50 g.p.m.) is about 190° F.

Following washing, the pulp is passed through four primary Cowan screens, and one secondary screen, with the rejects going on through Bauer centricleaners. The rejects from the Centricleaners are sent through a secondary set of 60 cleaners, and the rejects from these to Vorject cleaners. In each case the accepted stock is returned to process. The rejects from the Vorject cleaners are sewered. (Measured by company at less than 0.6 tons of pulp per day.)

Following screening and cleaning, the pulp is sent to the bleach plant where it is bleached in a 5-stage process employing,

DESCRIPTION OF PROCESS cont'd

Pulp Mill:- (b) cont'd

in the following order: chlorination, caustic extraction, chlorine dioxide, caustic extraction and then a final chlorine dioxide treatment. The pH of the pulp is adjusted after the bleaching to a value between pH 6.0 and pH 6.5 with sulphur dioxide. Water washes are used after each stage in the bleaching process.

Chlorine dioxide is produced by the reaction of a mixture of air and sulphur dioxide bubbling through a down-flow of sodium chlorate-sulphuric acid in a reaction tower. Sewered effluent is approximately 3 gpm.

Black Liquor Recovery:-

The black liquor recovered in the diffusers (20% solids) and from the brown stock washers (18% solids) is blended and sent to the recovery plant for regeneration of cooking chemicals, and make-up of chemical losses. The liquor is first screened to remove fibre, then thickened by evaporating, first in a 6-body, 5-effect evaporator and then in a cascade evaporator. (In the 6 stage evaporator, the first and second effects are used in parallel, and the third, fourth, fifth and sixth in series.) The resultant thick black liquor is sprayed by oscillating nozzles to two recovery furnaces, where the organic materials, which have been removed from the wood in the cooking process, are burned in reducing conditions. The resultant inorganic smelt drops to a dissolving tank, producing

DESCRIPTION OF PROCESS cont'd

Black Liquor Recovery:- cont'd

"green liquor", a solution of sodium carbonate and sodium sulphate.

The green liquor is clarified and pumped to a lime slaker, and then, with the lime, to a 4-compartment "white liquor" clarifier. Overflow from the clarifier is pumped to storage for re-use (as cooking chemical). The mud from the clarifier is pumped to a 2-stage mud washer of similar design. Weak liquor from here is pumped to storage for dilution in smelt dissolvers. Lime mud at 33% solids is repulped and fed to an Oliver vacuum filter and discharged at 55% solids to the sewer, pending installation of a kiln. The filtrate is used in the lime mud washer.

Machine Room:-

Three paper machines are in use, producing unbleached Kraft paper from the pulp stock that is produced in the old mill. All bleached stock from the new mill is finished in a pulp machine, which cuts the pulp sheet into four, 33" x 33" sheets as it leaves the machine. The sheets are baled and shipped for use elsewhere.

OPERATING DATA:

Production:- 150 tons per day unbleached Kraft paper

- 330 " " " bleached Kraft pulp

(A small part of the unbleached production is shipped as pulp at times)

Plant Operation:- New pulp plant, bleach plant, and pulp machine - 24 hours per day, 7 days per week

- Old pulp machine and paper machines (2, 3, and 4) - 24 hours per day, 6 days per week.

OPERATING DATA: cont'd

Number of Employees:- 760 (mill)

Water Consumption:- (Wabigoon Lake)

(a) Wood Room			- 2.4 MGD
(b) Bleach Plant			- 13.56 MGD
(1) Caustic -	-	4.32 MGD	
(2) Acid -	-	9.24 MGD	
(c) Pulp & Paper Mill			- 10.8 MGD
(1) Pulp mill	-	6.6 MGD	
(2) Paper mill #4 sewer	-	1.08 MGD	
(3) " " #6 "	-	3.12 "	
Total water consumption			- 26.76 MGD
Total pumping capacity (2 pumps @ 15,000 U.S. gpm each)			- 32. MGD

Water Treatment:- 6 North rotary filters, 100-mesh.

- no chemical treatment or chlorination.

Sanitary Water Supply:- from mill supply (not chlorinated)

Raw Materials:(daily consumption)

Wood	-	950 to 1,000 cords
Lime	-	85 tons
Salt cake (Sodium sulphate) (200 to 300 lbs. per ton pulp)	-	62.5 tons
Chlorine (liquid)	-	33 tons per day
Sodium chlorate	-	9 " " "
Sulphuric acid	-	7.5 " " "
Sulphur dioxide	-	3 " " "
Sodium hydroxide	-	20 " " "

PLANT SEWERS AND UNITS SERVED

Six sewers serve the pulp mill, bleach plant, and machine room as follows:

Sewer No. 1 - Liquor storage area - only small flow of surface drainage during this survey.

Sewer No. 2 - 4600 Imp. g.p.m. (6.6 MGD)
- unbleached white water overflow
- bleached white water overflow
- main diffuser sewer
- old digester room
- diffuser room floor drains
- blow tank drain
- blowdown condenser condensate
- green liquor drags bottoms
- mud filter cake
- North filter rejects (raw water)

Sewer No. 3 - Approximately 40 Imp. g.p.m. (est. 30 to 50)
- mechanical foam breaker

Sewer No. 4 - 750 Imp. g.p.m. (1.08 MGD)
- No. 1 machine white water chest overflow
- No. 1 machine former pit
- No. 2 machine wire pit overflow
- No. 1 machine vacuum pumps

PLANT SEWERS AND UNITS SERVED cont'd

Sewer No. 5 - 6300 Imp. g.p.m. (13.56 MGD)

- bleach plant and chemical building
  - (a) acid - 3000 Imp.gpm (4.32 MGD)
  - (b) caustic - 6500 " " (9.24 ")
  - (c) chlorine dioxide generator - 3 gpm

Sewer No. 6 - 2180 Imp. g.p.m. (3.12 MGD)

- wet press
- knots and tailings
- drainer water
- No. 4 machine white water overflow
- diffuser agitator drain
- machine coloured white water
- screen room white water overflow
- No. 3 and No. 4 machines sewers
- No. 4 beater

SURVEY PROCEDURE

Samples were taken from 5 of the 6 mill sewers throughout the day, compositing hourly samples where possible, and collecting grab samples every two hours where it was impossible to take hourly composites. The main pulp sewer has been equipped with a Parshall flume for measuring flow and a sampler for compositing a sample from small portions taken at regular, short intervals. Three such composites were taken from this sampler, and one grab sample from the sewer at the flume. The sewer that was not sampled carried only a small flow of yard drainage, having formerly served to sewer the wood room which is now sewered to a bark storage area.

Grab samples were taken at seven locations in the Wabigoon River, with Dissolved Oxygen and temperature determinations made at the time of sampling.

All samples were returned to the laboratory in Toronto for analysis as follows: (see Result Sheets)

- BOD
- Total, Suspended & Dissolved Solids
- Ignited solids
- pH
- Alkalinity and/or acidity
- Phenols, or phenolic equivalents
- Hardness
- Calcium
- Resin Acid Soaps.

All analyses except pH reported in ppm unless otherwise indicated

INDUSTRIAL WASTE ANALYSIS

September 9, 1958

Sample No.	5-Day BOD	Solids			Lab. pH	Alkalinity		Acidity	Phenols ppb.	Hardness	Ignited Solids	Calc-ulated	Resin Acid Soaps
		Total	Susp.	Diss.		Total	Phenol pH.						
2A	192	6912	6114	798	10.0	5140	40	-	2000	-	578	40	-
2B	800	6062	5190	872	10.2	5000	60	-	2100	-	634	60	-
2C	152	6826	6258	568	9.9	5340	44	-	4800	-	696	100	-
2D	-	-	-	-	-	-	-	-	-	-	-	-	1.6
3	1236	482	248	234	8.9	136	-	-	2300	-	-	-	-
4	291	1336	130	1206	7.9	76	-	-	25	-	216	-	-
5A	202	1176	84	1092	2.8	-	-	400	32	121	192	-	-
5B	74	842	96	746	3.2	-	-	180	20	100	-	-	-
5C	78	878	74	804	3.1	-	-	200	25	72	-	-	-
6	180	794	304	4900	7.6	196	-	-	250	-	58	-	-

2A - Sewer #2 - Composite 7 AM - 9 AM)
2B - " #2 - " 11 AM - 12 AM) (From automatic sampler)
2C - " #2 - " 2PM - 4 PM)
2D - " #2 - Grab 4.30 PM
3 - " #3 - Composite 10 AM - 4 PM
4 - " #4 - " 10 AM - 4 PM
5A - " #5 - Grab 10.30 AM
5B - " #5 - " 12.00 AM
5C - " #5 - " 4.00 PM
6 - " #6 - Composite 10 AM - 4 PM

All analyses except pH reported in ppm unless otherwise indicated

RIVER SURVEY

September 6, 7, 1958

Sample Point No.	Lab. No.	5-Day BOD	Solids Total	Solids Susp.	Solids Diss.	D.O. ppm	Sample Temp. C	Total Alkalinity as $CaCO_3$	pH	Phenols	Ignited Solids	Resin Acids
1	R1417	4.2	88	18	70	9.1	16.5	50	7.5	1	34	-
2	R1418A	136	1428	572	856	0	24.0	296	7.0	175	748	1.6
3	R1419A	21	310	78	232	4.1	19.0	104	7.5	50	168	1.6
4	R1420A	34	274	36	238	0.5	18°	116	7.1	50	158	1.6
5	R1421A	19	324	44	280	0.5	17.5	112	7.0	60	132	1.6
6	R1422A	8.8	210	32	178	2.7	17.0	68	7.0	15	52	1.6
7	R1428	1.2	210	16	194	7.0	17.5	88	7.0	15	66	-

1 Wabigoon River above mill

2 " " just below mill at CPR bridge

3 " " at Hwy. #17 bridge - 2½ miles below Dryden

4 " " Eaton-Rugby Road - 14 miles below Dryden

5 " " north of Minnitaki-19 miles below Dryden

6 " " at Hwy. #105 - 38 miles below Dryden

7 " " at mouth of river at Clay Lake - 52 miles below Dryden

DRYDEN PAPER CO., LIMITED

(Summary of Sewer Data)

	Flow	B.O.D.		Solids			Phenols
				Total	Susp.		
	(M.G.D.)	lbs/day	pop.equiv.	lbs/day	lbs/day	pop.equiv.	lbs/day
Sewer #1	- No flow this date -						
Sewer #2	6.6	25,146	150,000	435,600	387,000	1,935,000	196
" #3	0.043	530	3,170	208	100	500	1
" #4	1.08	3,150	18,800	14,400	1,400	7,000	0.27
" #5	13.56	16,000	96,000	131,000	11,500	57,500	3.5
" #6	3.12	5,620	33,000	24,800	9,500	47,500	7.8
Wood Room	2.4	- Discharged to impoundment area -					
Totals	26.8	50,446	300,970	606,008	409,500	2,047,500	208.57

B. O. D. - 25.2 tons per day (total)

Suspended Solids - 205 tons per day (total)

River flow - Annual average (1945 - 1955) - 1552 cfs. (Gauged at Quibell, approx. 45 miles downstream from Dryden).

CONCLUSIONS

The industrial waste and stream pollution survey which was made at the Dryden Paper Co., Limited, and on the Wabigoon River on September 7, 8, and 9, 1958, was intended to determine the total waste loading on the river, and to relate the wastes, generally, to the principal sources in the mill, and to their effects on the degree and extent of pollution in the river. Since mill operations were normal, and weather conditions consistently moderate, with little recent rainfall, it was felt that the analytical results, both of sewer and river samples, were fairly representative of conditions that existed at that time.

Expansion of production at the Dryden Paper Co., Limited, from approximately 250 tons per day of unbleached paper in 1954 to approximately 500 tons per day of unbleached paper and bleached pulp in 1958, has been carried out by a stepwise programme of modernization and enlargement of existing facilities, and the addition of new units at a total cost of about 15 million dollars. A lime kiln, the last major unit to be built in the recovery plant, is to be constructed and put into operation by late 1959. Burning of bark as fuel is being considered for the future.

Pollution of the Wabigoon River has been severe for many years, due mainly to the inherent inefficiencies of the equipment or methods used in the original mill. Steps have

CONCLUSION cont'd

been taken to minimize these losses, but any benefits that may have been obtained, so far as stream pollution is concerned, have been obscured by the additional loading that has been contributed by the increase in production. It has not been a case, then, of isolating the sources of wastes in the old mill, and applying corrective measures, (a major undertaking in itself), but also of bringing in new units and bringing their operation to an efficient level, while combining the old and new units into a single plant. Studies of sources of losses have been undertaken by the company, and it is expected will be broadened as part of normal plant operations on a continuing basis.

This present survey was not intended to consider the unit sources of waste in the mill, but rather to determine the total mill loading and its effect on the Wabigoon River. As with other Kraft mill studies, four waste components were considered:

(a) Suspended Solids:- There are two principal sources of suspended solids in the Dryden mill: lime mud (originating in the regeneration of caustic soda solution), and wood fibre. Bark has been a major problem in the past, but is now being impounded, with ultimate disposal to be considered by the Company in the future. Assuming all the daily consumption of lime (85 tons) to react with sodium carbonate in the recovery process to produce sodium hydroxide and calcium carbonate (lime mud), the amount of lime mud to be sewered is approximately 153 tons per day. This is discharged through sewer #2, and is shown in the summary on page 16 as contributing largely to the total suspended solids discharge. Re-use of

CONCLUSION

(a) Suspended Solids:- cont'd

lime, which will be made possible by burning in a lime kiln in late 1959, will greatly reduce the present discharge of suspended solids from this source. Fibre losses, even at a conservative estimate of 1 percent of production, would account for an additional 5 tons per day of suspended solids. However, no measurement of fibre loss was made in this survey, since it seemed of minor importance at this stage of the study of the mill, compared to the lime sludge. It is of major significance, of course, in the economy of pulp mill operation, and hence, will receive attention as a matter of good plant management. A fibre loss of between 1½ percent and 2.0 percent of production is considered representative of a modern, efficiently operated chemical pulp mill.

Most of the suspended solids settle in the 2½ mile reach of the river below the mill in a hydro impoundment, and do not seem to be excessive beyond that point.

(b) BOD:- The almost complete lack of dissolved oxygen in some 40 to 50 miles of the river below the mill indicates the degree to which the river is over-loaded. It can be shown that a river flow of 930 cfs or 348,000 gallons per minute, with a dissolved oxygen content of 10 ppm, would be necessary to provide the amount of oxygen necessary for the complete satisfaction of the BOD (50,446 lbs recorded in this survey). If the necessary amount of dissolved oxygen is not available, as is apparently the case here, the effect of BOD is carried downstream until

CONCLUSION

(b) BOD:- cont'd

the oxygen requirement is met. A flow of 1860 cfs with dissolved oxygen content of 10 ppm, would be required to ensure no more than 50 percent reduction in dissolved oxygen concentration. The annual average flow of the Wabigoon River, taken for 10 years (1945 to 1955) has been 1550 cfs indicating that the flow necessary to permit satisfaction of BOD is not present during the normal dry season periods, hence, the downstream extension of the effects of BOD as shown.

The population equivalent of the total mill waste, on the basis of 0.167 pounds of BOD per capita per day, is approximately 301,000, or equivalent in oxygen-consuming potential to the sanitary sewage from a city of that population. Sewer #2, serving the recovery plant, the old digesters and diffusers, and the new blow tank, contributes about 50 percent of the total BOD; and sewer #5, serving the bleach plant, contributes approximately 32 percent of the total. This latter is due, mainly, to the removal of the remaining non-cellulose material from the wood fibre by the bleaching chemicals and represents an 8 percent "shrinkage" in production of the bleach plant.

(c) Toxicity:- The production of toxic materials, as by-products of the cooking process, has always been of importance in Kraft mill waste studies. Crude sulphate turpentine is vented from the digesters wi with other volatiles, during the cooking period, and is condensed in a surface condenser, then separated by decantation from the condensate for burning in the recovery furnace, or for sale when market conditions are favourable. It is suspected that any abnormal losses of turpenes to the

CONCLUSION

(c) Toxicity:- cont'd

sewer would add greatly to the toxicity of the total mill waste. Resin acid soaps, also, by-products of cooking, remain in the black liquor and are removed, by skimming, prior to evaporation. They are similarly highly toxic, and require rigid control in their handling to minimize their adverse effects on the receiving waters. It is generally the practice in Kraft mills to skim off the soaps and feed them directly to the recovery furnace, and so avoid fouling the evaporators. Losses to the sewers have been due to improper handling and spills of the skimmed soap, or to direct losses of black liquor in the pulp mill or recovery plant. Resin acid soap determinations showed sub-lethal concentrations in the waste and in the river, although their low-level persistence throughout the river indicates a continuous, rather then intermittent, discharge.

(d) Tastes and Odours:- One of the most difficult aspects of the study of waste from Kraft mills has been the detection by analysis of waste components that produce tastes and odours in the receiving waters, where standard water analyses indicate recovery of the receiving waters to normal conditions. It is possible that certain organisms concentrate such substances in their metabolism, transmitting them to fish in the normal food cycle. This would explain why whitefish, for example, were reported as being tainted, while pickerel taken from the same waters, but which have different feeding habits, were not. If this assumption is correct, then extraction of such components from large volumes of water (by activated carbon filters, say) would permit their measurement

CONCLUSION

(d) Tastes and Odours:- cont'd

in the laboratory by the infra-red spectrophotometer.

Tastes and odours probably originate in relatively small volumes of wastes, including: (a) phenols, (in foam-control agents); (b) crude sulphate turpentine dissolved in the condensate and, hence, sewered from the turpentine decanter and; (c) sulphonated lignins in the black liquor. Control of phenols would be accomplished by the use of non-phenolic foam control materials. Although numerous proprietary compounds are used, some of themchloro-phenates, (e.g., Resinoid G), fuel oil is most commonly employed, especially in the paper machine head boxes, to prevent bubbles from being carried to the wire and producing defects in the paper sheet, and in the brown stock washers where the spent cooking liquor is separated from the fibre. In any case, it is likely that all phenolic compounds would be present in the river as chlorophenols in cases such as this, where the bleach effluent provides chlorine for the reaction with phenols.

It is probable that taste-and odour-producing substances are closely related to the toxic substances, so that control of wastes to reduce one effect will similarly reduce the other. However, the persistence of tastes and odours beyond the detectable limits of normal analyses, indicates the need for their complete removal and not merely their reduction. Determination of the actual substances in large volumes of river water, as suggested above, would perhaps indicate the sources of tastes and odours, and permit a study that might lead to their segregation at the source.

CONCLUSION

(d) Tastes and Odours:- cont'd

It should be noted that the water in Clay Lake probably has a trace of the typical Kraft mill odour, although the writer did not detect it at the time of this survey. The odour was quite noticeable at Highway 105, about 12 or 14 miles upstream, due, likely, to the aeration afforded by the rapids at that point. However, considering the persistence of the taste-and odour-producing substances in some 40 miles of the river, (i.e., at Highway 105), it is likely that they would continue, to some extent, at least, to Clay Lake, some 14 miles beyond.

Aside from the problem of industrial wastes disposal, it is noted that treated municipal water is not available on the west side of the Wabigoon River, so that the mill supply serves the drinking water requirements in the mill and offices, without chlorination or other preventive measures taken.

RECOMMENDATIONS

It has been shown in this survey that the Wabigoon River is severely polluted by Kraft mill wastes from the Dryden Paper Co., Limited, and that the recovery of the river by the normal process of natural purification does not take place for at least 40 or 50 miles below the mill. This prolonged effect of the wastes indicates not only over-loading, in the sense of de-oxygenation, for example, but also the characteristic persistence of tastes and odours that can usually be associated with Kraft mill wastes. Since these latter give rise to serious objection by persons using the downstream waters, beyond the point at which standard water analyses show pollution to exist, it appears obvious that a means of detecting tastes and odours, as well as means of identifying the causative agents, should be sought. Methods of controlling the loss of taste-and odour-producing substances in the mill and of determining the relationship to toxicity of the total wastes might then be indicated.

Following, or in conjunction with, a study of tastes and odours, and toxicity, consideration could be given to some of the standard methods of dealing with other waste components, particularly those contributing BOD and suspended solids. It is suggested, then, that the following be considered:

1. That the activated carbon filter technique for extracting organic substances from water be employed on a trial basis, to explore the feasibility of extracting measurable amounts of some of the more important components of Kraft mill waste. (Crude sulphate turpentine or turpenes, resin acid soap and sulphonated lignins or other organic

RECOMMENDATIONS cont'd

1. compounds. Identification in the laboratory might be made by infra-red spectrophotometry. Such a study might best be made as a special research project.
2. That a means of reducing BOD be sought by exploring the feasibility of lagooning or treating selected wastes, particularly those from the recovery plant and the digester, blow tank and diffuser areas, where black liquor losses are significant.
3. That a permanent method of bark disposal (and/or utilization) be employed. Continued use of a land area would seem difficult, since the quantity of bark to be disposed of is probably about 200 tons per day (estimated) or some 40,000 to 50,000 tons per year.
4. That the use of non-phenolic foam control agents and slimicides be investigated to minimize the discharge of taste-producing substances from this source.
5. That chemical and biological studies be continued by the company as a standard means of assessing the results of mill practices and alterations in terms of conditions in the river. The study of toxicity, as a part of these studies, could perhaps be related to item 1.
6. That drinking water supplies be chlorinated or otherwise disinfected.

In general, measurement of the volumes and nature of specific objectionable wastes can minimize the total undertaking of pollution control, by reducing the over-all problem to a number of problems, each of much lesser magnitude. Correction of unit waste discharges, on a priority basis, would then serve to first minimize or eliminate those waste components which give rise to the most serious objection, and

RECOMMENDATIONS cont'd

which would shorten the zone of pollution so that the distant downstream waters are not adversely affected. Every effort should be made to bring about an immediate, large-scale improvement in water quality. It is recognized that this is a major problem involving considerable study and investigation to obtain the most-effective measures. Close examination of all wastes for treatment separately or collectively will help in finding a solution. The Ontario Water Resources Commission is prepared to assist in any way possible in this program to obtain a clean stream with the minimum of delay.

Prepared by:

R H Mitgest

Director - Labs. & Research:

A. U. DeLaporte

Supervised by:

J. A. Voege

Per a J.K.

Approved - General Manager:

A. E. Berry

RHM:ns

DRYDEN TOWN

REPORT

Ontario Water Resources Commission

Municipality Town of Dryde.. Date of Inspection April 15, 1959.

Re: Sewage Disposal System

Field Inspection by _____ Report by Mr. W. S. MacDonnell.

M E E T I N G held at 1:00 p.m.
in the Council Chambers of the
Town of Dryden on Thursday
April 16th

Present for the Town:

Mayor J. L. Skillen
Clerk W. H. Hambleton
Councillors E. Sherwood
J. G. Wilson
P. Matiece
A. H. Aitken
Town Engineer S. T. Owen

Present for the Commission: Mr. W. S. MacDonnell.

The purpose of the meeting was to discuss the Proctor and Redfern preliminary survey of one year ago, undertaken by Mr. Proctor. The problem was one of a choice of sites as reviewed by Mr. John Barr in the fall of 1958.

Assessment: $5,764,975.
Debt: 1,270,000.
Anticipated Debt possible:

1. $125,000. for highschool.

2. Proposed fifty-bed addition to hospital.

Water rates: Flat rate of $32.00 per year per house.

Water consumption: 1.1 M.G.P.D.

In addition, dairy water consumption, 20,000 gallons per day, created a waste disposal problem.

Council discussed the alternate sites for the location of the sewage disposal plant, and wondered if primary treatment might be accepted if the system discharged at one of the sites into a series of small lakes. The alternate site involves discharge of effluent at some distance above the city's water intake and appears to be a risk factor re pollution of municipal water supply.

Conclusion 1.

Mayor Skillen stated that Mr. Proctor was returning to the Town in a month or so. At that time, final determinations would be made with respect to site location for the sewage disposal plant.

Conclusion 2.

Council were advised that the Commission would require the Town of Dryden to press on with sewage treatment facilities.

W. S. MacDonnell
Executive Officer

WSM:gm

KENORA

April 17th, 1959

A D D R E S S

to

KENORA DISTRICT CAMP OWNERS ASSOCIATION

by

W. S. MacDONNELL

ONTARIO WATER RESOURCES COMMISSION

I bring the greetings of our General Manager, Dr. A. E. Berry to you. He has asked me to inform you that he is planning a meeting at Fort Francis in the near future and would be pleased to meet with representatives of your group at that time, should you so desire.

The OWRC was originally formed by an act of the legislature in 1956. The idea of such a body developed from the recommendations contained in a water resources survey of the province conducted by a committee composed of men from the Department of Health, the Department of Planning and Development, the Department of Mines and various citizens, one of whom was Mr. A.M. Snider, the present chairman of the Commission. These recommendations concerned:

1. The most critical water situation existing in the southwestern section inland from the Great Lakes.
2. Adequate and ever-increasing water supplies needed for domestic consumption, for industrial demands, for agriculture and for recreation.
3. Planning of water sources and supplies as necessary far in advance of need.
4. Pollution of streams and rivers so controlled as to ensure proper clean water for the above purposes.

5. Water supply to be dealt with on an area rather than a municipal basis having regard to developing, financing and managing.

6. Over-all legislation to be developed to achieve the various objectives mentioned.

It is then interesting to turn to the estimates of water and sewage requirements for Ontario which were projected and submitted to the Royal Commission on Canada's Economic Prospects in January of 1956. These projections were made by Mr. Snider, at that time chairman of the Ontario Water Resources and Supply Committee, and Dr. A. E. Berry, present general manager of the OWRC and at that time, director of the Sanitary Engineering Branch of the Department of Health. I will not go into great detail in talking of this projection, but I would like to draw to your attention that the projected water supply requirements for 20 years were established at one billion, one hundred million dollars. The reasons for this great growing need are not hard to find, when one considers the rapid growth of our urban population concentrated in relatively small areas in the midst of an unprecedented industrial expansion requiring water in amounts never dreamed of even 15 years ago. These demands have led to an increasing demand upon the ground water supplies of the province which have definite limitations.

A further complicated factor has been the truly disastrous pollution of our once-beautiful streams and rivers with both domestic and industrial wastes and sewage. Finally we were and are suffering in the realm of water supply and sewerage from the same factors that gave the province such a tremendous highway problem, namely, the depressed era of the thirties when funds were not available for construction of large and expensive water works and sewage disposal facilities, followed by the war years when men, materials and money were all channeled into the fight for our very existence to the detriment of public works of all kinds. The level of construction of necessary sewerage facilities in order to maintain proper health standards and to provide even some small measure of control of pollution did not occur until 1949.

A further factor accentuated the need for the expenditure of vast sums for sewerage works is our increasing industrialization which, as I have said, leads to increasing population concentration in urban centres and the creation of new municipalities and urban areas, and further leads to vast amounts of industrial wastes which must be treated or reclaimed prior to disposal, if it is not to foul our natural waterways.

With this background, the Ontario Water Resources Commission was brought into being by the Ontario Water Resources Commission Act of 1956 which was repealed and supplanted by the Ontario Water Resources

Commission Act, 1957. Now I would like to set out the scope and authority which the Commission has, to deal with the problems I have mentioned, and it is my intention then to tell you what specifically has been done to date by the Commission.

1. The Commission supervises the operation of all water, sewage treatment and wastes plants throughout the province either private or municipal, through inspection, and stands ready to provide technical assistance if required.
2. Reviews all plans, with power to approve or disapprove, of water and sewage projects whether undertaken by municipalities or persons or private industry.
3. If requested, engineers, constructs, finances and operates water and sewage works for municipalities or groups of municipalities in Ontario.
4. Advises municipalities concerning water treatment requirements for clear healthy water and proper sewage treatment and disposal.
5. Maintains complete laboratory and research services relative to water, sewage and industrial wastes which are available to municipalities and private industry.
6. Carries on continuous searches for additional ground water sources, particularly in areas where the shortage of water is acute.

7. By licensing and controlling well-drillers, protects the water table in various areas to ensure no interference with existing ground water supplies.

8. Carries out extensive surveys and tests of streams and rivers to establish the extent of pollution, the cause of pollution, and the means whereby the situation can be corrected.

The technical operations of the Commission are divided into five divisions to deal with these objectives and purposes.

Firstly - Laboratory and research

Secondly- Construction of facilities and plants including financing

Thirdly - Operation of plants

Fourthly- Sanitary engineering and

Fifthly - Water - its supply, treatment and distribution

In a broader sense, the Commission functions to build, finance and operate water supply and sewage facilities for municipalities, and secondly, excercises a close supervision over the water resources of the province including supplies and waste disposal facilities. I do not think it can be emphasized too frequently that the purpose and the thinking of the Commission are to remove these problems from the purely municipal aspect which has surrounded them in the past, both in assessing the problem and in the financing and operation of the projects, and to think and plan in terms of whole areas, regardless of local political boundaries.

The usual procedure followed by a municipality in applying for assistance from the Commission is to present a plan to the technical people of just what they wish to construct and for what purposes. This plan is carefully scrutinized, discussed, and if necessary, altered. The cost is examined in light of the financial position of the municipality and, of course, Ontario Municipal Board approval of the financing must be obtained. Then the project is proceeded with by tender, called by the Commission.

The Commission supervises all phases of construction and pays all the bills. When completed, the plant is operated by the Commission with advice and assistance from a local advisory committee. These committees are appointed by the municipality concerned to work with the Commission's technical men in the operation and administration of projects. The cost of the project is repaid by the municipality to the Commission in annual installments extending over 20 to 30 years. It is not necessary for the municipality to issue any debentures for these projects and the municipality pays in any one year the interest that the Commission must pay to obtain its money from the government based on the annual borrowings of the Commission. This will tend to provide financing for many municipalities at a rate lower than they could get in the money markets with their own credit.

The Commission also has the power to defer capital repayments for the first few years of the operation of any project. The advantages of this are obvious when you think of a large area project with a steep

initial cost. It is possible to pay only interest for up to five years while the system is put into operation and the various consumer groups, who in the last analysis must pay for it, are being organized and brought into the system.

Now I would like to look at the actual work that has been done and is presently being done within the framework I have just sketched for you. I would like to deal firstly with what I call the "free" services the Commission provides to the municipalities and industries throughout the province. As I have said, the Commission eventually collects from the municipalities its capital expenditures together with interest in connection with construction of municipal water and sewage works. However, no charge is made for any administrative activities of the Commission in connection with these projects including inspections while under construction, accounting, supervising and all the other administrative costs of carrying through these very large undertakings.

Also, all the services of the Laboratory and Research Division as well as the Division of Sanitary Engineering and the Ground Water Branch are carried on free of charge on behalf of municipalities, individuals and private businesses. In 1958 the Division of Sanitary Engineering did 259 pollution investigations on 110 streams and lakes; did a complete survey of 33 streams; inspected all canneries to see what wastes were being emptied into streams, and did complete pollution surveys on seven counties, namely, Kent, Middlesex, Oxford, Brant, Essex, Norfolk and Elgin.

Further, in 1958 complete water resources information was collected

and assembled for six counties-- Kent, Middlesex, Essex, Elgin, Norfolk and Brant. It was on the basis of this survey and what it revealed about the water situation in Middlesex County that has led to the final agreements being signed to start the work on a proposed pipeline from London area to Lake Huron. These reports are quite exhaustive in scope, and embrace an assessment of the water position of each municipality in the county. In due course, the sum of all thes county reports will, of course, give us a complete picture of the water resources and problems of broad areas of our province. These surveys do not cost the municipality anything. A survey has been recently instituted for the Lakehead area to help solve a supply problem there.

In addition, 37 geological investigations were made on behalf of municipalities and individuals in 1958 for the purpose of locating additional sources of well water. In 23 of these cases, detailed report and recommendations were supplied to those concerned. Also the collection of water level records in wells continued throughout the year These records are used by the public in assessing water levels and depth for well digging and so on. All these records are compiled and made available at no cost.

In regard to research, the Commission ran three pilot plants for treatment and disposal of industrial wastes and one was operated in co-operation with the industry concerned. Time was spent on the possibility of spray irrigation for the disposal of industrial waste.

An industrial waste conference is being held at Honey Harbor in June of this year and it is expected that industries which have a definite waste disposal problem such as tanning, food processing and pulp and paper mills will attend to learn and exchange ideas with others.

Complete studies of industrial wastes of 20 municipalities were made, with a view to prescribing the degree of treatment necessary before the waste could be introduced into the municipal sewage system. Involved in this were 400 manufacturing plants and methods of treatment were outlined in each case. All this is provided to the municipalities and industries at no cost to them. In addition, research was carried on independently by the Commission into the wastes from smelters, uranium mines, pulp and paper mills and other industries all with a view to some form of treatment to end forever the pollution of our streams, the killing of our fish, the ruination of our recreational areas by industrial waste.

Few people realize the truly immense problem we have with industrial waste. As just one example, the pulp and paper industry produces waste equivalent in strength to the sewage from approximately 6½ million people. These figures serve to illustrate the enormity of the problem. Involved in this research were wastes from 620 different types of plant with products running from baby food to petroleum chemicals, and entailed over 50,000 chemical t4sts and 8,8871 examinations of various types of bacteria.

To obtain full co-operation and use of the laboratory facilities and technical personnel of the Commission, it is only necessary for a municipality or an industry to ask. The Commission welcomes the opportunity to help and to get people thinking in terms of cleaning up these wastes as it is only fair to warn that the Commission is determined to put our streams, rivers, lakes and ponds back into a state of natural beauty and cleanliness even if some very heavy pressure has to be applied.

Of particular interest to the rural areas is the constant research into well water sources. Individuals living in rural areas cannot hope to take advantage of pipelines and large storage facilities and must depend on present wells and new ones for their water supply. Increased urbanization has brought with it an increase in market gardening and this in time has focussed attention on irrigation. It is my own feeling that we must anticipate very great increases in the rural demand for water for irrigation of all kinds of crops to increase yield. The constant research into well water for this purpose must proceed, in order that the water will be available as the needs arise. Incidentally, all well-drillers are now licensed, and must report to the Commission every well that is drilled.

Now, in regard to projects actually engineered, constructed and operated by the Commission or under construction as at January 31st, 1959, there were 24 waterworks with an actual or estimated value of $8,326,798. and for the sake of the record and to give you an idea of the widespread

geographical distribution of the Commission's undertakings, I am going to read the full list of municipalities involved--

OWRC Projects Completed, Under Construction or Under Agreement as at Jan 31, 1959

Water Works

	Actual or estimated cost
x Bancroft	240,840.
x Brock Twp (Sunderland)	100,328
x Dresden	171,968
X Dundas	339,953
x Essex Town	86,389
x Frankford	119,297
x Harrow	498,186
x Havelock	179,115
x Port Perry	62,421
x Richmond Hill	222,020
y Alfred	137,974
y Bolton	57,200
y Huntsville	86,727
y Kitchener	300,000
y Markham Township	501,838
y Markham Village	46,431
xx Essex County (Union Water System)	3,726,855
Ancaster Township	255,186

Sewage Works

	Actual or estimated cost
x Coniston	466,202
x Frankford	164,079
x Korah Township	44,808
x Richmond Hill	360,559
x Stratford	927,244
x Streetsville	306,781
y Bancroft	97,220
y Brampton	914,600
y Brantford	2, 166,686
y Huntsville	414,696
y Kitchener	2,150,500
y North Bay area (Contract B $105,280)	2,130,000
y Port Arthur	2,046,971
y Stirling	221,479
y Trenton (Stage 1 $415,981)	1,390,500
y Waterloo	426,949
xx Toronto Township	1,752,834

Water Works	Actual or estimated cost	Sewage Works	Actual or estimate cost
Dunnville	525,000	Burlington	425,200
Marmora	174,920	Fergus	163,361
Orangeville	62,000	Galt	290,000
Preston	20,000	Georgetown	830,000
Stayner	10,000	Leamington	115,000
Winchester	312,150	Listowel	350,000
		London Township	965,130
		Marmora	16,100
		Mitchell	300,000
		Orangeville	128,000
		Sault Ste. Marie	2,581,000
		Tillsonburg	535,830
		Wiarton	98,160
	$8,236,798		22,815,839

GRAND TOTAL WATER WORKS AND SEWAGE WORKS $31,052,637

x - in operation xx - in partial operation y - under construction

The 30 sewage works have a total estimated value of $22,815,839. Thus, all active Commission projects at the end of January of this year had a total estimated value $31,052,637.

Individual items range from as little as $46,431 for a water supply for Markham Village to a $3,726,855 for a pipeline system in the Essex County

area, and from $44,000 for a sewage job in Korah Township to two-millio dollar plants at North Bay, Port Arthur, Brantford, Kitchener and Sault Ste. Marie. I think you will agree that the Commission has an impressive record of achievement for the first two years of its existance.

In addition to the projects which I have mentioned, there are some 50 other municipalities at some active stage of negotiation with the Commission in regard to sewage or water works. One of the larger projects which is in the preliminary stage concerns North London and th complete London area for somewhere in the region of ten to twelve million dollars of waterworks carrying water to several municipalities from Lake Huron.

I would like to tell you of the Essex County integrated water pipeline project. The pipeline itself is 30 miles in length and it pumps chlorinated water to users along the entire length. The intake is from Lake Erie and a filtration plant with an initial capacity of eight million gallons daily is just being completed at the village of Union. Eventually its capacity will be 32 million gallons daily. The pipeline itself runs from the filtration plant to Ruthven, Union Leamington and Essex. It serves the townships of Mersea, Gosfield South, Gosfield North and Maidstone, and also serves the H.J. Heinz and Stokely Van Camp food processing plants. The total cost on completion will be close to four million dollars. Its value to the County of Essex cannot be measured in dollars and cents and indeed, will only become apparent as it assists in the development of this area in the years to

come.

There is another small pipeline from Lake Erie which serves the Town of Harrow, and it was the first pipeline project of the OWRC to go into actual operation. This line serves only one community and costs $500,000. But it is providing and will provide for the foreseeable future, an assured supply of clear clean water to an area which was for years subjected to a most unsatisfactory supply of well water.

Now I would like to deal specifically with some problems that affect your area. The Commission is in touch with Dryden, Kenora and Fort Frances respecting their municipal wastes problems. Good progress towards waste treatment needs are expected this year.

The disposal of pulp and paper mill wastes, and their effects on the waters receiving them have been a matter of concern in Ontario for many years. The Pulp and Paper industry is one of the largest industries in Ontario with seven pulp mills, nineteen integrated pulp and paper mills and seventeen paper mills producing some 3,180,000 tons of products per year. The total water consumption and hence waste-water to be disposed of by the forty-one mills is estimated to be well in excess of 280,000,000 gallons per day. I use these figures to indicate that the regional problem here is only a part of the overall industrial waste problem in the province. Nevertheless your regional problem is an important one to which my Commission is giving close attention.

The problems that are presented in this situation are very complex. Similar problems exist in the U.S.A., Sweden, Denmark, Germany and England. The Pulp and Paper Research Institute and other such groups on this continent have experiments and research in progress. The Ontario Water Resources Commission are in touch with the progress that is being made. The solutions are often difficult to resolve and each mill presents different combinations of problems.

In your region there is a problem concerning the effluent from a major paper mill. This mill has one of the highest capacities for production of its kind in the Province and because of its size produces a correspondingly large pollution problem. The mill processes in effect in this instance are relatively efficient by comparison with others.

There is also a difficult problem involved in odour and taste. The company has an 18 point programme of dealing with its waste problem. We have inspected this programme yesterday and can assure you that reasonably good progress is being made in this matter. My Commission will continue to inspect and assist in this matter until a satisfactory conclusion has been reached.

We are considering the feasibility of a pollution conference later

this year to which groups such as yours would be invited to attend and discuss pollution problems of the various regions of the province. This will be similar to the very successful algae conference we held last fall for municipalities bordering Lake Erie and Lake Ontario. Over twenty municipalities were represented among the three hundred and two people who attended. This is merely an illustration of the programme which the Commission has in mind for dealing with pollution abatement and for the control of wastes of all kinds. The programme is a very large one and the support and co-operation of all interested parties is requested. The results which can be expected from work of this kind in the welfare of the people of the Province can be outstanding and a major contribution will be forthcoming when this programme reaches its climax.

ONTARIO MINNESOTA PULP AND PAPER COMPANY

REPORT

ONTARIO WATER RESOURCES COMMISSION

Municipality Kenora

Re: Minnesota Pulp & Paper Co., Ltd., Mr. E.E. Crandall, Resident Manager

No. of Employees 1050

Production Two tons newsprint per day

Wastes discharged by closed pipe to point downstream on Winnipeg River just downstream from Kenora and influences the waters of a large tourist area. (eg. Minaki Hotel) This problem should be studied in detail.

Municipality Fort Frances

Re: O.& M. Pulp & Paper Co., Mr. F.G. Williams, Resident Manager

No. of Employees 900

Production 400 tons of newsprint and groundwood paper daily.

Wastes discharged to Rainy River (--Mill on U.S. side discharges wastes at same point in the river) and constitutes a boundary waters pollution problem.

General Conclusion

In both these mills - waste disposal and other problems are similar to those of Abitibi and Great Lakes at the Lakehead of which the specifics have not yet been determined. No recent investigations (last 15 years) have been carried out.

Copy for W. S. MacDonnell

REPORT

Ontario Water Resources Commission

Municipality Fort William - Port Arthur Date of Inspection September, 1958.

Re: A Summary of Industrial Wastes Disposal in Fort William and Port Arthur

Field Inspection by R. H. Millest, and E. T. Ciebien Report by R. H. Millest, P. Eng.

An industrial waste survey was made in Fort William and Port Arthur in September, 1958, to determine the quantity and characteristics of the principle wastes being discharged to the municipal sewers or directly to the surface waters.

Fort William and Port Arthur are located on Thunder Bay on the north-west shore of Lake Superior. Fort William lies entirely on a low, flat plain near the south-end of the Bay, and Port Arthur on mainly higher ground to the north and north-east. The only sections of Port Arthur lying on low ground are the south end, adjacent to Fort William, and a narrow strip extending along the waterfront to the eastern city limits.

The Kaministiquia (Kam) River drains most of the low plain on the south (Fort William) and enters the south end of the Harbour through 3 channels: the Mission River, the McKellar River, and the Kam River, (from south to north). Proceeding north, the streams entering the harbour are as follows: Neebing River, just north of the Fort William - Port Arthur boundary; McIntyre River, ½ mile north of the Neebing; McVicar's Creek, in mid-Port Arthur; Current River, near the north-east limits of Port Arthur.

Industrial development is almost entirely along the Kam River in Fort William, and along the Harbour shore area in both cities. The storage and shipping of grain is the main industry, with 26 elevators

handling some 275,000,000 to 300,000,000 bushels per year. Pulp and paper manufacture, creosoting and wood preserving, truck-trailer and motor bus manufacture, oil refining, and grain milling and starch extraction are the main process industries.

SURVEY PROCEDURE

Thirteen industries that were considered to be important as sources of pollution were visited to obtain operating data (type of process, water consumption, etc.) and to collect samples of effluent for chemical analysis in the laboratory. General information regarding the operation of the grain elevators was also obtained to permit comment on the discharge of dry grain wastes that may occur.

Complete survey reports of the following industries have been prepared:

Abitibi Power & Paper Co., Ltd. -- Thunder Bay Division

" " " " " -- Fort William Division

Provincial Paper, Ltd. -- Port Arthur

Northern Wood Preservers, Ltd. -- Port Arthur

Ogilvie Flour Mills of Canada, Ltd. -- Fort William

Husky Oil & Refining Co., Ltd. -- Fort William

Summary (Fort William)

Name	Type of Industry	Water Consumption Private	Water Consumption Munic.	Waste Disposal	Remarks
Abitibi Power & Paper Co., Ltd., (Fort William)	Newsprint mill	4.1 M.G.D.	Sanitary & boilers	Mill waste to Mission River, bark impounded. San. wastes (office) to septic tank	High BOD (spent sulphite liquor,)susp. solids. Sewered population equiv. (BOD) 166,000
Great Lakes Paper Co., Ltd.	Newsprint mill	40 M.G.D. (approx.)	Sanitary	Mill wastes to Kam River. Bark burned	High BOD (spent liquor), susp. solids. Sewered pop. equiv. (BOD) 760,000 (est.)
Husky Oil & Refining Co., Ltd.	Oil refining (catalytic reforming)	1.2 M.G.D.	Sanitary	Through baffled skimmer to McKellar R. - constructing A.P.I. separator.	New separator should control oil - to be further study re phenols.
Ogilvie Flour Mills (Starch plant)	Manuf. of wheat starch, gluten, etc.	84,000 g.p.d.	Sanitary	To Kam River	Starch plant effluent 84,000 g.p.d. - Sewered pop. equiv. (BOD) 140,000 requires pre-treatment
Canadian Car Co., Ltd.	Bus & trailer manuf. -- aircraft sections	--	6 m.g.d.	To Municipal sewer	Some metal cleaning --- most of volume results from testing vehicles.
Kakabeka Falls Brewing Co., Ltd.	Brewery	--	7000 g.p.d. (approx.)	To Munic. sewer	Conventional brewery wastes-- comparable to strength of sewage-- recovery of grain mash for sale.

Summary (cont'd)

Port William (cont'd)

Name	Type of Industry	Water Consumption Private	Water Consumption Munic.	Waste Disposal	Remarks
Twin City Abattoir	Slaughterhouse	--	?	To Storm sewer to Kam River	Normal small slaughter-house wastes -- no recovery of blood
Port Arthur Abitibi Power & Paper Co., Ltd. (Thunder Bay Div.)	Newsprint mill	13.5 M.G.D.	250,000 g.p.d. (approx.)	To Port Arthur Harbour - bark screened - wastes settled in lagoon at shore	High BOD (Spent sul-phite liquors) and suspended solids Sewered Pop. equiv. (BOD) 187,600
Provincial Paper Ltd.	Fine papers	16.6 M.G.D.	Sanitary	To Port Arthur Harbour -- bark screened, some escapes to Bay	High BOD (Spent sul-phite liquor) suspended solids. (China clay)- Sewered population equiv. (BOD) 123,000
Northern Wood Pre-servers, Ltd.	Barking, Sawing and Creosoting ties and poles	865,000 g.p.d.	Sanitary	To Port Arthur Harbour	Creosote and oil wastes from production & use of pre-servatives - wood wastes from barkers and sawmill.
Canada Malting Co. Ltd.	Malting plant	Vol. not known	21,000 to 133,000 g.p.d.	To Port Arthur Harbour	Moderate BOD, low solids, from grain steeping wastes.
Koppers Products Ltd.	Coal tar coating Compounds & asphalts	--	Sanitary & boiler	To Port Arthur Harbour	Very little effluent (intermittent).
Doran's Brewery Ltd.	Brewery	--	50,000 g.p.d. (approx.)	To munic. sewer	Wastes normally comparable in strength to sanitary sewage may be some shock loading - grain mash recovered.

Summary (cont'd)

Port Arthur (cont'd)

Name	Type of Industry	Water Consumption Private	Water Consumption Munic.	Waste Disposal	Remarks
Port Arthur Ship building	Boat & ship repairs construction	---	100,000 g.p.d. (approx.)	To Thunder Bay	Ship building, machine shop and woodworking wastes--may be some oil at times.

Total water-use of 13 major industries (in both cities), excluding dairies, bottling plants and grain elevators, is approx. 76.5 million gallons per day.

Sewered population equivalent of the four paper mills is approx. 1,235,000 (estimated)

CONCLUSIONS

It can be readily seen, in a survey of waste disposal in Fort William and Port Arthur, that the proportionately large discharge of industrial wastes (compared to sanitary sewage) contributes largely to the over-all pollution problem. The preponderance of industrial waste loading is best illustrated by the BOD results, for which the sewered population equivalent of the four pulp and paper mills alone is approximately 1,235,000. Other process wastes (starch plant, breweries, etc.) probably bring the total figure to about 1,500,000. In other words, provision of municipal sewage treatment facilities takes care of the BOD loading of the urban population of some 80,000 still leaving a much greater loading to be treated by the industries if this aspect of pollution is to be suitably handled.

Also of major importance is the matter of the deposition of solids in the Harbour areas. Two principle sources are to be considered:

(a) Pulp & paper wastes: -- Assuming a fibre loss of 1.5%, the total daily production of about 2000 tons of paper in the two cities gives rise to a fibre loss of about 30 tons per day. (This would be considered a minimum loss). In addition, the loss of bark and other solids, such as china clay, etc., is to be considered.

(b) Grain elevators: -- Although grain handling and storage is a dry process, dust and husks, etc., that are normally removed and sold as stock feed, contribute large quantities of settleable solids when improperly handled. It has not been possible to obtain a measurement of the quantity of grain solids being discharged (intentionally or otherwise) to the water, but it is thought to be significant in view of the large amount of grain handled each year.

CONCLUSIONS (cont'd)

Of particular importance with respect to municpal water supplies is the discharge of petroleum or coal tar wastes which contribute phenols and oil. Provision has already been made by Husky Oil & Refining Co., Ltd., in Fort William, for the installation of conventional oil separators, and further studies are to be made to evaluate the need for treatment of phenolic wastes. Wastes from the creosoting plant of Northern Wood Preservers, Ltd., in Port Arthur, have been a source of complaint for some time. As a result of last year's survey by the Commission, the Company is planning to pump all wastes inland for treatment in an oil separator that is to be built. Further studies will then be made to determine the phenolic content of the resulting effluent.

No up-to-date information is available on the movement and concentration of wastes in Thunder Bay itself, and so it is not possible to comment on the effects of the various industrial effluents except in general terms. It is felt that specific information might be needed before some of the contributors of pollution can be convinced of the need for corrective action.

REGISTERED PROFESSIONAL ENGINEER R. H. MILLEST PROVINCE OF ONTARIO

Prepared by:

Supervised by:

Director, Labs. & Research:

Approved - General Manager:

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